HORTICULTURAL ABSTRACTS

Vol. XXVII September 1957 No. 3

INDEX OF CONTENTS

[Initialled abstracts and reviews not by Bureau staff are by R. J. Garner and A. P. Preston of the East Malling Research Station, by A. H. Strickland and H. L. G. Stroyan of the Plant Pathology Laboratory, Harpenden, and by J. R. Llewelyn.

Nos.
MISCELLANEOUS Abstr. 78. Noted 49 .. 2009-2088w
General .. 2009-2011
Statistical design .. 2012
Air pollution .. 2013-2015
Biochemistry .. 2016-2027
Physiology .. 2028-2033
Growth substances .. 2034-2048
Tissue culture .. 2049-2051
Seeds .. 2052-2053
Nutrition .. 2054-2060
Soil management and irrigation .. 2061-2068
Glasshouses .. 2069-2074
Machinery and apparatus .. 2075-2082
Marketing .. 2083-2086
Noted .. 2087a-2088w

TREE FRUITS, DECIDUOUS Abstr. 93. Noted 36 .. 2089-2183j
General .. 2089-2091
Varieties and breeding .. 2092-2102
Propagation and rootstocks .. 2103-2122
Tree growth and composition .. 2123-2137
Spraying for cultural purposes .. 2138-2140
Pruning .. 2141-2145
Nutrition and soil management .. 2146-2165
Fruit composition .. 2166-2169
Packing and storage .. 2170-2179
Processing .. 2180-2181
Noted .. 2182a-2183j

SMALL FRUITS, VINES AND NUTS. Abstr. 56. Noted 37 .. 2184-2241k
Small fruits .. 2184-2202
Vines .. 2203-2224
Nuts .. 2225-2239
Noted .. 2240a-2241k

PLANT PROTECTION OF DECIDUOUS FRUITS Abstr. 99. Noted. 47 .. 2242-2342u
General .. 2242
Disturbances of nutrition or of unknown origin .. 2243-2254
Climatic factors .. 2255-2264
Viruses .. 2265-2270
Bacteria .. 2271-2274
Fungi .. 2275-2296
Mites .. 2297-2302
Insect pests .. 2303-2320
Nematodes .. 2321-2322
Other pests .. 2323-2324
Fungicides .. 2325-2334
Insecticides .. 2335-2340
Noted .. 2341a-2342u

Nos.
WEEDS AND WEED CONTROL Abstr. 37. Noted 12 .. 2343-2380l
General .. 2343-2346
Herbicides and their application .. 2347-2352
Control of aquatic plants .. 2353-2354
Control of woody plants .. 2355-2358
Weed control in fruit crops .. 2359-2361
Weed control in ornamentals and lawns 2362-2366
Weed control in sugar cane .. 2367-2370
Weed control in vegetables .. 2371-2379
Noted .. 2380a-2380l

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE Abstr. 175. Noted 50 .. 2381-2557x
General .. 2381-2398
Artichokes .. 2399
Asparagus .. 2400
Brassicas .. 2401-2409
Celery .. 2410
Cucurbits .. 2411-2429
Legumes .. 2430-2456
Mushrooms and other edible fungi .. 2457-2459
Onions and allied crops .. 2460-2464
Root crops .. 2465-2474
Salad crops .. 2475-2490
Spinach .. 2491-2492
Tomatoes, capsicums and eggplants .. 2493-2554
Sundry crops .. 2555
Noted .. 2556a-2557x

TOBACCO Abstr. 57. Noted 23 .. 2558-2615w
General .. 2558-2560
Varieties .. 2561-2564
Seeds and seed-beds .. 2565-2572
Water and other climatic factors .. 2573-2576
Soils and nutrition .. 2577-2585
Physiology and biochemistry .. 2586-2596
Diseases and pests .. 2597-2610
Curing and fermentation .. 2611-2614
Noted .. 2615a-2615w

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS Abstr. 55. Noted 38 .. 2616-2672l
Condiment and spice plants .. 2616-2617
Drug plants .. 2618-2625
Essential oils .. 2626-2636
Fibres .. 2637-2642
Hops .. 2643-2652
Insecticidal plants .. 2653-2654
Plant sources of antibiotics .. 2655-2658
Seed oils .. 2659-2666
Sundry plants .. 2667-2670
Noted .. 2671a-2672l

Nos.
FLORICULTURE Abstr. 89. Noted 45 2673-2763s
General 2673-2686
Annual and herbaceous plants .. 2687-2701
Bulbs, tubers, etc. 2702-2730
Lawns 2731-2732
Succulents 2733-2735
Roses 2736-2748
Other trees and shrubs.. 2749-2761
Noted 2762a-2763s

SUB-TROPICAL FRUIT AND PLANTATION CROPS Abstr. 63. Noted 44 2764-2828r
General 2764-2765
Avocadoes 2766-2770
Citrus—propagation 2771-2772
Citrus—tree composition and nutrition 2773-2779
Citrus—pollination 2780
Citrus—frost damage, diseases and pests 2781-2807
Citrus—fruit harvesting, storage and composition 2808-2811
Dates 2812-2814
Litchis 2815
Macadamias 2816
Olives 2817-2823
Passion fruit 2824
Tung 2825-2826
Noted 2827a-2828r

Nos.
TROPICAL FRUIT AND PLANTATION CROPS Abstr. 164. Noted 71 2829-2995s
General 2829-2834
Bananas 2835-2838
Cacao 2839-2846
Cloves 2847-2848
Coconuts 2849-2856
Coffee 2857-2883
Mangoes 2884-2888
Oil palms 2889-2910
Pineapples 2911-2916
Rubber trees 2917-2923
Sugar cane 2924-2957
Tea 2958-2984
Sundry crops 2985-2992
Noted 2993a-2995s

NOTES ON BOOKS AND REPORTS Abstr. 28. Noted 12 2996-3024l
Books 2996-3011
Annuals and reports 3012-3022
Revived periodical 3023
Noted 3024a-3024l

Total abstracts 994. Noted 464.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

SALIENT ITEMS, Vol. 27, No. 3.

ENVIRONMENT

Climate in general:—The broad effects of weather on growth are considered for grapevines (2206), coffee (2863), oil palms (2903) and some ornamental shrubs (2751).

Rainfall under trees:—The pattern of rainfall reaching the ground is apt to be very irregular under shade trees (2865).

Water needs:—The comfortable concept of equal potential transpiration, irrespective of crop size or character, receives a sharp jolt in 2066. In glasshouse crops there is a close relationship between transpiration and solar radiation (2497). The level of moisture supply affects the anatomy of apple trees (2124), the top : root ratio in vegetables (2383) and the time at which tillers are formed by sugar cane (2933). In tobacco plants water uptake varies with plant age (2574). Studies are also reported on methods of measuring transpiration in oil palms (2905), and on the mechanism of water uptake and movement in bean plants (2032, 2033).

Temperatures:—Warmth during dormancy stops archespore development in plum flower buds (2136). With apples delayed warming up of the soil in spring need not retard flowering and may favour root development (2128). The growth of apple fruits is influenced by night temperature (2130) and that of strawberry plants by root temperature (2200). Temperature also affects the amino-acid composition of tulip plants (2730).

Light intensity:—With laurels the length of the growing season and the amount of growth made can be markedly reduced by shading (2758). Higher rates of synthesis of leuco-anthocyanins in the leaves, and of lignin formation in the fruit stones, occur on the sunny side of plum trees than in shaded parts (2027).

Soil management:—There are points of interest in several papers on the effects of mulches and other cultural practices in deciduous orchards (2159–2162) and coffee plantations (2866). There are also comparative studies of several *Crotalaria* species as green manure crops (2833, 2834).

GROWTH PHENOMENA

Growth rhythms and relations:—Studies have been made on cambial activity throughout the season in olive trees (2817, 2818) and on the waxing and waning of the active roots in young and mature tea bushes (2977). In apples detailed investigations are described on the relations between seeds and fruit (2131). In root vegetables a surprising correlation appears to exist between the time of flowering of seed plants and the yield of their progeny (2465).

Plant exudates and extracts:—Seed germination may be stimulated in some cases, and inhibited in others, by sap extracts from the parent fruits (2053). Similarly, seeds may themselves excrete substances, which in low concentrations stimulate, and in high concentrations inhibit, their own germination (2052). Extracts from certain weeds can inhibit seed germination or root growth in crop plants, which is particularly unfortunate in that the weeds in question are common in the writer's garden (2345). The roots of peas and other crop plants excrete appreciable quantities of amino acids which stimulate the micro-organisms of the rhizosphere (2436, 2437).

Stop and go:—Or in other words maleic hydrazide and gibberellin. The latter wins hands down this time, and it would appear rapidly to be assuming the status of the growth-promoting substance to end all growth-promoting substances (2034–2037, 2476). On MH there is a contribution on its mode of action (2041).

Other growth substances:—Readers who can tear themselves away from gibberellins may perhaps like to disentangle points of interest from two somewhat complex abstracts on the biological activity of certain aromatic organic compounds (2044) and on the effects of several compounds on cucumbers growing under different light intensities (2413). Other papers describe the effect of growth substances on apricot fruits (2139, 2140), on sex expression in melons (2420) and on the essential oil content of mint plants (2631). The amine salts of 2,4-D may increase the sucrose content of sugar cane even when applied early in the growth of the plants (2942), but sprays of molasses may have an even greater effect (2943).

Rough stuff:—Walnut and globe artichoke growers should avoid making ultrasonic noises (2237, 2399), but apple breeders may find thermal neutrons more useful than X-rays (2099).

MACHINERY AND EQUIPMENT

Machines and implements:—If one excludes a small drill which will sow seeds singly (2076), the few new items described in this number have all been designed for use in vineyards; they include hydraulic borers for making planting holes (2212, 2213), shredders for preparing fodder from vine shoots (2224) and a mobile tent to keep vine pruners warm (2223).

Buildings and equipment:—In addition to papers on various aspects of glass and plastic houses (2069 *et seq.*) a system of fan and mist cooling for such houses is described (2759) and an account is given of the growing of watercress under a plastic film (2490). There are new features in the construction of controlled-atmosphere fruit stores (2171) and tobacco kilns (2611), and details of equipment for mist propagation units (2077), controlled environment chambers (2078) and frost research rooms (2256), and a hot-water unit for treating sugar cane setts (2950). The use of wire netting as a heating element in the electrical warming of soils is also described (2063).

Research apparatus:—Apparatus is available for freezing buds artificially (2257), for administering electric shocks to seeds (2079), and also for measuring relative humidity close to a leaf surface (2080), solar radiation (2081), leaf area (2082) and photosynthesis (2971).

NUTRITION

General aspects:—In Russia enthusiasm for azotobacter and for "bacterial fertilizers" continues unabated (2386, 2404, 2511, 2580). With apples the presence of mycorrhiza has been shown to enhance growth and to affect mineral composition (2125). In an avocado grove the soil may change appreciably over a period of years as regards not only the content of different elements but also their distribution (2766). An evaluation of the efficiency of sugar cane in using applied nitrogen may also be mentioned (2937).

Nutrient culture techniques:—Applying a nutrient mist to the roots of apple trees (2153) and the adaptation of water culture to studies on tea (2966).

Plant composition:—In tobacco leaf analysis data are presented as percentages of dry matter and as weight per unit of leaf area; the latter is considered the more reliable (2594). There is further information on variations in plant composition due to season (2126, 2134, 2217), leaf position (2773, 2970), leaf age (2969) and crop load (2233). Apple fruits from different orchards may show a very wide range in the concentrations of some of the major elements (2163). The relative amounts of different amino acids in plants may be altered by deficiencies of Mo and S (2518, 2519).

Absorption and translocation:—Basic studies concern the effects on lemon seedlings of ammonium and nitrate N with and without pH control (2775), the absorption by apples of P from different sources (2152), the selective uptake of cations by beetroot tissue (2059), solution pH and other factors affecting the absorption of foliar-applied nutrients (2056), and the absorption by leaves of an odd collection of obscure elements (2057).

Minor elements:—There is evidence that Co is essential to rubber trees (2922) and Li to carnation plants (2687). Among interrelationships examined are Br and Cl (2516), Cu, Fe and Mo (2480), Mo and S (2923) and Mn and other elements (2869).

Plant responses:—Interesting or unusual plant responses to nutrients include the effects of N, P and K on the water content of lettuce plants (2481), the effects of certain trace elements on the rate of maturation of vegetables (2406) and on flower colour in gloxinias (2698), and a thickening of tobacco leaves in response to Mn deficiency (2584).

Plant indicator for mineral deficiencies:—*Tradescantia fluminensis* is suggested (2060).

PLANT PROTECTION

Host-pathogen relationships:—The effects on plant metabolism of the *Fusarium* and *Verticillium* wilt diseases and certain bacterial diseases seem likely to keep some biochemists and physiologists occupied for many a year (2421, 2498, 2537, 2538, 2634). Other problems that will help to keep them in full employment include the production by plants of fungistatic compounds as defence mechanisms against attack (2657, 2658) and the feeding of plants with organic compounds to promote disease resistance (2276).

Fungi and bacteria as control agents:—Three papers describe the use of harmless organisms to control harmful ones (2394, 2531, 2663) and two report somewhat variable success with bacilli used to control caterpillars (2313, 2610).

Fungicides:—In Italy a determined attempt to find substitutes for copper fungicides is reflected in a spate of papers on non-copper compounds, with zineb leading the field by a comfortable margin (2326–2330 and elsewhere). New organic fungicides and antibiotics, with such names as Omadine, Thioneb and Nystatin (Mycostatin) continue to multiply for use on plants (2272, 2278, 2288–2290, 2333, 2408) and on fruits in storage (2282, 2291, 2427). After all this it is almost a surprise to encounter that old favourite among insecticides, lead arsenate, re-emerging as a useful fungicide against coffee leaf spot (2880).

Toxicity:—In addition to the risks run by human beings in using plant therapeutants (2335), it would seem that the risk to many plants has sometimes been underestimated (2681, 2682, 2704). Where such damage takes the form of scorching it can be measured (2325), but the case in which growth is merely depressed by one concentration and perhaps even stimulated by a slightly weaker one provides a thorny problem (2393).

Irradiation:—Gamma irradiation shows promise for the control of post-harvest diseases of several fruits (2283, 2809). Ultraviolet light also kills some fungus spores (2983).

Nematodes:—Layering favours the dissemination of *Pratylenchus* among clonal apple rootstocks (2322). Vapam will control *Tylenchulus* in citrus groves when applied in irrigation basins, provided that the concentration is varied to suit the type of soil (2806). Many plants found tolerant to V-C 13 Nemacide are listed (2685).

Viruses:—If tests (2853, 2946) show that plants are infected it is sometimes possible to suppress the virus by applying chemicals (2266, 2444). In heat therapy the results may vary with the strain of the virus (2600), and there are also cases in which the disappearance of symptoms is merely temporary (2788, 2789). Heat treatment can, however, be effectively combined with meristem tissue culture in raising clean carnation plants (2688) and the meristem method may also be used for geraniums (2695). Seed-borne tomato mosaic virus may be reduced by washing seeds in running water or eradicated by soaking them in HCl (2525).

PROPAGATION

Seeds:—The physiology of germination is the subject of studies on pome fruit and oil palm seeds (2103, 2901). Various methods of testing seed protectants have also been compared (2446).

Corms:—Cyclamen plants can be raised from sections of corms placed on a nutrient medium (2706).

Cuttings:—Vitamins may overcome polarity in lemon cuttings (2772) and new growth substances can assist coleus cuttings to root (2755). Other investigations concern the effects of media and potassium nutrition on peach cuttings under mist (2106), the effects of temperature on cuttings of ornamentals (2749), and methods of storing hardwood cuttings of deciduous fruits during the winter (2104). For vine cuttings covering the soil with polythene may help rooting (2210).

Budding and grafting:—Polythene bags have proved satisfactory for covering grafts (2109). Budded rose cuttings can be rooted under mist if the buds are protected with a waterproof wrap (2739). A bud-wrapping clamp is available to help the ham-handed (2108).

Plant storage:—Polythene again, this time as liners for crates containing strawberry plants held in cold storage (2197).

Rootstock-scion relations:—The rootstock appears to exert a considerable influence on the mechanism of photosynthesis of the scion (2028), and with apples it also affects the ability of scion cuttings to regenerate (2105). In top-worked apple trees incompatibility troubles may sometimes be due to differences in osmotic pressure between scions and interstocks (2114). The grafting of tomatoes on burro-burro shrubs to promote bacterial-wilt resistance has reached the commercial stage in British Guiana (2528).

MISCELLANEOUS

Back to primitive man:—Who doubtless ate lichens (2669) and the leaves of non-leguminous plants possessing root nodules (2667).

Classification of species:—Biochemistry as an aid to (2723).

Flavour:—Methods of awarding marks (2382).

Identification of varieties:—The mathematical approach (2101).

Metaxenia:—In chestnuts (2226).

Pruning:—Its nomenclature (2141) and the effects of time of pruning on bud burst and fruiting in vines (2221, 2222).

Seedy readers, who have managed to get thus far, are referred to 2621.

MISCELLANEOUS.

General.

2009. Newell, J.
The John Innes Institution and its work.
J. roy. hort. Soc., 1957, **82**: 107-21, bibl. 9, illus.

An interesting account of some of the many problems which have been attacked with singular success by workers at this comparatively young institute with its first director, Bateson, appointed in 1909. The author deals mainly with the more immediately practical problems solved or benefits conferred, among them the following: the John Innes composts, balanced steaming of glasshouse soils, size of pot in which to start outdoor tomatoes, use of soil blocks, proper use of light and appropriate sources of light, orientation of glasshouses, importance and use of spacing in production of true seed, artificial ripening of tomato fruits, rogueing young tomato plants, breeding of apples, cherries, blackberries and strawberries, production of apple × pear hybrids, production of hybrid tomatoes, incompatibility in tree fruits, production of self-fertile cherries, establishment of the National Rose Species collection, breeding and propagation of roses—to name but a few.

2010. Jacquy, P., and others.
L'horticulture au Maroc. **(Horticulture in Morocco.)**
Terre maroc., May 1957, Numéro spécial, pp. 7-47, illus.

This number includes articles on the following subjects: nurseries for raising stocks of deciduous and evergreen fruit trees, vines and nut trees; olive growing; citrus production and trade; production and trade in tree fruits, grapes and nuts; vegetable production and tomato export; horticultural research, including tomato and onion varieties, pruning of clementines and N-P-K nutrition of orange trees.

2011. Bennett, L. G. (and Haddow, T. C.).
The use of labour on fruit farms and glasshouse holdings.
Misc. Studies Univ. Reading Dep. agric. Econ. **10**, 1957, pp. 33, bibl. 4, 3s. 6d.

Data on labour organization were obtained from 12 top fruit growers and 6 glasshouse growers in the south of England, and are tabulated in charts showing seasonal labour distribution for different types of holding and different crops. The measure of labour productivity used was the input-output ratio with adjustments to allow for variable factors. Two work studies are described.

Statistical design.

(*See also* 2287, 2341 l, 2993x.)

2012. Federer, W. T.
Augmented (or hoonuiaku) designs.
Hawaii. Plant Rec., 1956, **55**: 191-208, bibl. 9.

In response to the need for more efficient designs for comparing seedlings in the early stages of a [sugar cane] breeding program, a new class of experimental designs, augmented designs, was developed. The analyses for the augmented randomized complete block and the augmented latin square designs are given and illustrated with numerical examples. Basically, the designs presented herein have one set of treatments (the varieties) repeated *b* times and a second set of treatments (the seedlings) appearing only once. A standard design (except for additional plots in the block) and analysis are used for the varieties, while the augmented design analysis is used for the varieties and seedlings together. The designs are also useful in the fields of entomology, pathology, chemistry, physiology, agronomy, and perhaps others, for combining screening experiments on new material and preliminary testing experiments on promising material. [Author's summary.]

Air pollution.

(*See also* 2249, 2752, 2887.)

2013. Adams, D. F., Hendrix, J. W., and Applegate, H. G.
Relationship among exposure periods, foliar burn, and fluorine content of plants exposed to hydrogen fluoride.
J. agric. Food Chem., 1957, **5**: 108-16, bibl. 32, illus.

Controlled fumigation experiments were initiated to determine the effects of environmental variables on the rate of foliar response to hydrogen fluoride fumigation. Forty plant varieties were exposed to atmospheric concentrations of 1·5, 5 and 10 parts per billion [U.S.] of hydrogen fluoride in daylight and darkness. Correlations between exposure factor and accumulated foliar fluoride level for family, genus, and species were calculated. The varieties fumigated were on an average 91·3% more responsive to hydrogen fluoride in darkness than in daylight. Varieties were somewhat more responsive to a daily low fumigation concentration than to twice weekly higher concentrations of approximately equivalent exposure factor.—Mich. St. Coll., East Lansing.

2014. Solberg, R. A., and Adams, D. F.
Histological responses of some plant leaves to hydrogen fluoride and sulfur dioxide.
Amer. J. Bot., 1956, **43**: 755-60, bibl. 25, illus.

Young apricot, apple and plum trees, and tomato and bean seedlings were fumigated with hydrogen fluoride or sulphur dioxide. Similar histological effects on the tissue were induced by both compounds. Ways in which an air pollutant may enter and injure a leaf are discussed. The evidence indicated that sub-lethal concentrations of fluoride on entering a leaf were transported acropetally. Visible marginal injury occurred when phytotoxic levels were reached.—Univ. Calif., Los Angeles, and St. Coll. Wash., Pullman.

2015. Eršov, M. F.
Photosynthesis in clean and dusty leaves of *Tilia cordata* and *Ulmus pinnato-ramosa*.
[Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **112**: 1136-8, bibl. 6.

Leaves of lime and elm were dusted with smoke discharge from a coal-fired boiler at about the rate that naturally deposited dust is found in Kujbyšev during dry weather, i.e. 2–2·5 g. per sq. m. leaf surface. On warm clear days in June photosynthetic activity between 5 and 8 a.m. was found to be higher in the dusted than in clean leaves, but after 8 a.m. the reverse was the case, photosynthesis being particularly low in dusted leaves between 11 a.m. and 2 p.m. Daily dry matter increment was lower in the dusted than in clean leaves. During cooler weather and at lower light intensity in September the dusted leaves again showed lower photosynthetic activity and dry matter accumulation. The different reaction of various species to air pollution and the important effect of gases on plant growth are mentioned.

Biochemistry.

(*See also* 2087b, g, m, t, z, 2088b, e, s, 2662, 2671d, 2672 l, 2753.)

2016. Martin-Prevel, P.
Dosages de K, Ca et Na par photométrie de flamme dans le matériel végétal. Élimination des interférences. **(Determination of K, Ca and Na in plant material by flame photometry. Elimination of interferences.)**
Fruits d'Outre Mer, 1957, **12**: 59-65, bibl. 27, illus.

Interference by P is eliminated by fixation of the elements to be determined on a column of cation-exchange resin. Standard solutions and graphical calculations obviate mutual interferences of K, Ca and Na and effects of Mg, Mn, Fe, Al, SO_4 and SiO_2 ions.

2017. Specht, A. W., Koch, E. J., and Resnicky, J. W.
An emission spectrochemical analytical system as a tool in plant-nutrition and soil investigation.
Soil Sci., 1957, **83**: 15-32, bibl. 19.

The system of spectrographic analysis described allows simultaneous determination of Mg, Ca, P, B, Mn, Fe, Cu, Na and Al in plant material in powder or solution form. Statistical analysis of results is discussed. Logarithmic transformations of plant-composition data were lower in variance than the original data. The analytical error of the system was very much less than that due to plant material.—U.S. Dep. Agric., Beltsville, Md.

2018. Shimp, N. F., and others.
Spectrochemical analysis of soils and biological materials.
Soil Sci., 1957, **83**: 51-64, bibl. 6.

The methods described are: (1) spectrographic determination of Al, Ca, Cu, Fe, K, Mg, Mn and Sr by wet digestion and buffering with pure sodium nitrate; (2) concentration procedure for quantitative determination of Bi, Cd, Co, Cr, Ga, Mo, Ni, Pb, Sn, Ti, V and Zn, using HCl and the complexing agents 8-quinolonol, thionalide and tannic acid, followed by spectrographic analysis.—N.J. agric Exp. Stat.

2019. Vanselow, A. P., and Bradford, G. R.
Techniques and applications of spectroscopy in plant nutrition studies.
Soil Sci., 1957, **83**: 75-83, bibl. 11.

Techniques developed and used at the University of California Citrus Experiment Station are described in detail. They cover determination of 29 trace elements in plant tissues and examination of experimental fertilizers for trace-element contents which might vitiate results.

2020. Bussmann, A.
Vergleichende Untersuchungen zwischen Extraktions-und Ascheanalyse an Apfelblättern und Methodisches über den Gewebetest. **(A comparison of extraction and ash analyses of apple leaves and methods of tissue testing.)**
Z. PflErnähr. Düng., 1956, **74**: 128-34, bibl. 14.

Extraction by sodium acetate or HCl was compared with ash analysis in determining leaf contents of N, P and K in Cox's Orange Pippin and Freiherr von Berlepsch. Leaf content values for P and N varied with the method of determination, but K values were similar for both methods. Extraction by HCl was less dependent than acetate extraction on the degree of leaf maceration.—Eidgenöss. Versuchsanst. Obst- Wein- u. Gartenb., Wädenswil.

2021. Jackson, R. K., and Brown, J. G.
The determination of zinc in plant material without the use of organic extractants.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 1-5.

The method is less sensitive than the dithizone method, but its simplicity partly compensates for this disadvantage.—Univ. Calif., Davis.

2022. Heitefuss, R.
Erfahrungen zur quantitativen papierchromatographischen Bestimmung von organischen Säuren. **(Experiences gained in the quantitative determination of organic acids by paper chromatography.)**
Angew. Bot., 1957, **31**: 61-2, bibl. 4.

It had been shown that after infection by *Peronospora brassicae* citric acid increases in cabbage tissue, while malic acid slightly decreases. The paper describes methods of determining these differences quantitatively. —Inst. PflPath. PflSchutz, Univ. Göttingen.

2023. Jordan, C., Korte, F., and von Sengbusch, R.
Die papierchromatographische Bestimmung der einzelnen Säure- und Zuckerarten als Grundlage für die Auslese auf Wohlgeschmack bei Obst, Beerenobst und Gemuse. **(The determination by paper chromatography of acids and sugars as a basis of selection for flavour in fruits and vegetables.)**
Züchter, 1957, **27**: 69-76, bibl. 4, illus.

The acid and sugar contents of several citrus and temperate fruits and of some vegetables was studied by paper chromatography. Differences in contents were detected between types, varieties and individuals.—Max-Planck-Inst. ZüchtForsch., Hamburg.

2024. Coles, C. H., and Waygood, E. R.
The extraction of enzymes from succulent plants.
Canad. J. Bot., 1957, **35**: 25-30, bibl. 21.

The extraction of enzymes concerned with malic acid metabolism from succulent plants, notably *Bryophyllum* *calycinum*, has been made possible by the introduction of a new technique. The high concentration of organic acids in the vacuoles of leaf cells was neutralized *in situ* by vacuum infiltration with ammonia solution. Thus, during maceration, the enzyme proteins are neither precipitated nor inactivated and conventional methods of enzyme purification may be applied. Further experiments have shown that, whereas *B. calycinum* plants may lose their ability to fix carbon dioxide actively in the dark following exposure to short days (7½ hours), the enzymes involved in malic acid metabolism and carbon dioxide fixation in the dark are not necessarily depleted. [Authors' abstract.]—Dep. Bot., McGill Univ., Montreal.

2025. Kamerbeek, G. A.
Peroxidase content of dwarf types and giant types of plants.
Acta bot. neerl., 1956, **5**: 257-63, bibl. 12.

High leaf contents of peroxidase were associated with dwarfing in *Tropaeolum majus*, bean, tobacco and maize plants.

2026. Giri, K. V., Krishnaswamy, P. R., and Appaji Rao, N.
Occurrence of flavokinase activity in plants.
Nature, 1957, **179**: 1134-5, bibl. 5, illus.

Genera showing the presence of flavokinase in dormant seeds include *Brassica*, *Phaseolus*, *Pisum*, *Ricinus*, *Sesamum*.—Indian Inst. Sci., Bangalore.

2027. Hillis, W. E., and Swain, T.
Influence of illumination on the synthesis of leuco-anthocyanins in leaves.
Nature, 1957, **179**: 586-7, bibl. 3.

It has been shown that the occurrence of leuco-anthocyanins in leaves is closely associated with a woody habit in plants. The authors found that the synthesis of these compounds in the leaves of the Victoria plum was markedly affected by illumination. Tabulated figures illustrate the differences that existed in the content of methanol-soluble leuco-anthocyanins and total phenols between leaves taken from the sunny and the shady sides of the tree. Shading experiments proved the higher leuco-anthocyanins content on the sunny side to be due to more intense illumination. The dependence of leuco-anthocyanin synthesis in the plum leaf on illumination was paralleled by lignin formation in the stone (endocarp) of the fruit, stones from the shady side showing a slower hardening than those from the sunny side. It is felt "that the results of these experiments point to a correspondence between lignification and formation of leuco-anthocyanin which may lead to a better understanding of the metabolism and biosynthesis of aromatic compounds in woody species".—Low Temp. Res. Stat., Cambridge.

Physiology.

(*See also* 2087e, o, u, x, y, 2088d, i, l, 2434, 2435, 2587, 3004.)

2028. Rubin, B. A., and Germanova, V. F.
The influence of the root system on the photosynthetic mechanism. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1956, **107**: 757-6.

In leaves of nasturtium (*Tropaeolum majus*) grafted on broad beans (*Vicia faba*) and sunflower (*Helianthus annuus*) the content of the pigments chlorophyll a and b, carotene and xanthophyll, and the activity of the enzymes catalase and cytochromoxidase differed from those in nasturtium on its own roots, and resembled those in the rootstocks. From this it is concluded that the differences in the photosynthetic mechanism of different groups of plants are due largely to the specific activity of their root systems.

2029. Klein, W. H., and others.
Photocontrol of growth and pigment synthesis in the bean seedling as related to irradiance and wavelength.
Amer. J. Bot., 1957, **44**: 15-19, bibl. 19, illus.

Wet weight of leaves, inhibition of hypocotyl length and stimulation of epicotyl length were found to be approximately proportional to the log of the incident energy, with maximum effectiveness in the red at 630–700 mμ, which was markedly more effective than the far-red. Increase in relative anthocyanin concentration in the bean hypocotyl also was approximately proportional to the log of irradiance, with the red more effective than the blue and markedly more so than the far-red. The increased synthesis, however, does not appear to be a direct photochemical conversion of a precursor and it is suggested that it is coupled in some manner with the growth photoreactions. The rate of chlorophyll synthesis and changes in concentration of protochlorophyll did not show any relationship to the log function of the photomorphogenic reactions. The results indicated that at least the final steps in chlorophyll synthesis are not directly concerned with photomorphogenesis. [From authors' summary.]—Smithsonian Inst., Washington, D.C.

2030. Vickery, H. B.
The capacity of leaves of *Bryophyllum calycinum* to recover from prolonged exposure to darkness or to light.
Plant Physiol., 1956, **31**: 455-64, bibl. 10.

Excised leaves in water were kept in darkness for 36, 60 or 84 hr. and then exposed to light for 11 hr. Others were exposed to light for 27, 50 or 74 hr. and then placed in darkness for 11–14 hr. After prolonged darkness the ability to accumulate organic solids on return to light was reduced or even reversed, while the accumulation normally occurring during the first few hours of darkness was apparently completely prevented by long exposure to light. The rate of starch production was progressively reduced after increasing periods of darkness, and decomposition of starch in darkness was retarded increasingly by prolonged previous exposure to light. The normal dark-synthesis of malic acid was reversed after 18 hr. of darkness and was very markedly reduced after prolonged illumination. Synthesis and breakdown of citric acid were affected in a similar way. Isocitric acid content remained approximately constant during long periods of darkness, but these induced a rapid fall on subsequent exposure to light. There was a gradual fall in continuous light. In general, synthesis and breakdown of starch were correlated with breakdown and synthesis respectively of organic acids, but prolonged illumination induced marked deficiency in subsequent dark-synthesis of organic acids.—Conn. agric Exp. Stat., New Haven, Conn.

2031. Janković, V.
Uticaj veštačke svetlosti na porast i anatomiju nekih biljaka. **(The effect of artificial light on the growth and anatomy of certain plants.)** [English summary 1 p.]
Arh. poljopr. Nauke, 1956, **9**(24): 65-75, bibl. 25, illus.

Ocimum basilicum, *Calendula officinalis*, *Sinapis alba*, *Solanum tuberosum* and *Vicia faba* were illuminated over 3 months for periods of 8, 12 and 16 hours a day with 3 types of fluorescent lamp, red-white (LF-2500), white (LF-3500) and blue-white (LF-7000), at an intensity of 3,000 lux per sq. m. Maximum growth, surface area, weight and leaf number were attained by plants illuminated with the red-white lamps, and minima by those illuminated with the blue-white lamps. Anatomically the differences were most marked in the development and the thickening of the cell walls of the xylem tissue. Growth at 16-hour day-length was more vigorous than at 12 and 8 hours.

2032. Brouwer, R.
Water uptake from water and salt solutions.
Acta bot. neerl., 1956, **5**: 268-76, bibl. 17, illus.

When actively-transpiring bean plants were transferred from distilled water to a salt solution water uptake immediately decreased, followed by a gradual increase to a constant level. Studies have shown that under these conditions water uptake is largely regulated by the mechanical suction tension in the xylem vessels, and that little is due to osmotic forces.—Bot. Lab., Univ. Groningen.

2033. Brouwer, R.
Investigations into the occurrence of active and passive components in the ion uptake by *Vicia faba*.
Acta bot. neerl., 1956, **5**: 287-314, bibl. 30.

The relation between water uptake and ion uptake was studied under various experimental conditions using young plants of *Vicia faba*. This relation could be modified by the addition of sugars or inhibitors to the nutrient solution. There were indications that a major part of the ions entered the transpiration stream by means of a process dependent on metabolism, and that only a few ions were passively transported in the transpiration stream.—Bot. Lab., Groningen.

Growth substances.

(*See also* 2049, 2050, 2052, 2088o, 2345, 2349-2352, 2420, 2476, 2477, 2677, 2755.)

2034. Wittwer, S. H., and Bukovac, M. J.
Gibberellins—new chemicals for crop production.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 469-94, bibl. 11, illus.

Developments in the use of gibberellins are reviewed with particular reference to the results of recent trials by the Department of Horticulture, Michigan State University [see also *H.A.*, 27: 1047]. *General effects on growth:* Treatment with gibberellins has produced significant increases in both fresh weight and dry matter in celery, has hastened flowering and maturity in beans, caused earlier heading in broccoli and markedly advanced flowering in stocks. Dwarf, determinate tomatoes also flowered and fruited earlier, but the standard, indeterminate, midseason and late varieties tended to flower later, as did sweet peppers. *Earlier flowering of annuals for seed production:* Under suitable condition of temperature and day-length gibberellins accelerated flowering and seed production in several varieties of lettuce, endive, mustard and radish, an effect generally accompanied by marked elongation of seed stalks. *Earlier flowering of biennials for seed production:* Biennials which flowered in their first year without cold treatment included carrots, collards, cabbage and kale; gibberellins were only effective in such cases, however, if the plants had reached a size at which they would normally flower if exposed to cold. *Seed treatments hasten germination:* Quicker germination and seedling emergence occurred when pea and bean seeds were soaked overnight in solutions containing gibberellins. *Fruit setting:* Gibberellins have proved very effective in setting tomato fruits without pollination, and in preliminary trials cucumbers and eggplants have shown similar response. *Other uses:* Reports of investigations elsewhere suggest that gibberellins can break dormancy in potatoes and in seeds of ornamentals and deciduous fruits and will enhance the growth of nursery stock. Other suggested uses are the extension of the northern boundary for crop production and the aiding of crops to compete with weeds.

2035. Marth, P. C., Audia, W. V., and Mitchell, J. W.
Effects of gibberellic acid on growth and development of plants of various genera and species.
Bot. Gaz., 1956, **118**: 106-11, bibl. 7, illus.

The acid was supplied in lanoline paste or as an aqueous solution to external or cut surfaces of 49 plant species. Stem elongation was induced in most plants, being slight in conifers, nil in onions and gladioli, and very marked in young growth of beans, orange seedlings, geranium, Japanese maple, *Capsicum*, poinsettia, some rhododendrons, sugar cane, tomato and tulip tree. In general treated plants developed temporarily paler leaves, either narrower or broader than normal. Celery developed longer and wider petioles. In orange and pentstemon lateral as well as axial growth was stimulated. There was no evidence of increased flower-bud initiation, but existing flower buds developed more rapidly in treated plants of geranium and petunia. On the other hand flowering was delayed in *Capsicum*. Treatment at flowering did not increase the number or growth rate of bean pods and did not accelerate ripening of bananas. In general root development was checked in proportion to increased stem growth. [For a short popular account see *H.A.*, 27: 31.]

2036. Lona, F.
Recenti esperienze sulle proprietà dell'acido gibberellico. **(Recent work on the properties of gibberellic acid.)**
Riv. int. Agric., 1956, **1**(10-11): 68-76, bibl. 20, illus.

The director of the Botanical Institute of the University of Parma gives brief details of some of his recent experiments with gibberellic acid. It has stimulated the germination of lettuce seeds, the sprouting of dormant buds in *Fagus sylvatica* and the bud growth of other woody plants such as lilac. The author discusses the evident possibility of increasing ultimate yields by appropriate use. His own experiments showed that certain long day plants, e.g. *Crepis*, *Papaver*, etc.) can be induced to flower even under short day conditions by its use. He points out that gibberellic acid may lessen frost or drought resistance in some cases in the open field. He considers that the easiest method of application is spraying, and that time of application should vary according to circumstances. He lists many relevant scientific articles by himself and others.

2037. LONA, F.
L'azione dell'acido gibberellico sull'accrescimento caulinare di talune piante erbacee in condizioni esterne controllate. Nota preventiva. **(The action of gibberellic acid on stem growth of certain herbaceous plants under controlled external conditions. Preliminary note.)** [English summary ½ p.]
Nuovo G. bot. ital., 1956, **63**: 61-76, bibl. 9, illus.

Experimental plants included *Circaea lutetiana*, *Perilla ocymoides* (var. *nankinensis* and a green type), *Tinantia fugax*, *Crepis leontodontoides* and *Lactuca scariola.* In rosette plants and others dwarfed by short-day treatment gibberellic acid at 10^{-4} concentration applied to the terminal bud induced elongation of the 4 or 5 youngest internodes. It was ineffective, however, in counteracting nanism when night temperatures were low (3° C. or less). The elongation took place without previous development of flower buds, thus the action was different from that of vernalization.

2038. COOKE, A. R.
Influence of 2,4-D on the uptake of minerals from the soil.
Weeds, N. York, 1957, **5**: 25-8, bibl. 7.

During the first few hours after spraying bean plants with 100 mg./l. of 2,4-D there was an increase in the uptake of radioactive K, Cl, Ca and S. At the end of 24 hours, however, mineral uptake was inhibited. These results are discussed in relation to the effect of 2,4-D on plant respiration.—Agric. Exp. Stat., Okla.—From *Weed Abstr.*, **6**, No. 435.

2039. HAY, J. R., AND THIMANN, K. V.
The fate of 2,4-dichlorophenoxyacetic acid in bean seedlings. II. Translocation.
Plant Physiol., 1956, **31**: 446-51, bibl. 21.

Translocation of 2,4-D applied to the cut surface of a primary leaf was accompanied by extensive breakdown and ceased half way down the hypocotyl. None entered the root. With application up to 75 μg. per plant, translocation was proportional to the amount applied, but larger amounts checked movement from the leaf. Distribution was approximately equal between xylem and cortex, but ringing completely stopped downward movement. In darkness there was no translocation except that induced by sucrose application. Other sugars failed to produce this effect, and sucrose was ineffective at low temperatures (4° C.) and did not stimulate translocation in the light. A metabolic factor is indicated as responsible for the internal transport of 2,4-D.—Harvard Univ., Cambridge, Mass. [For part 1 see *H.A.*, 27: 1402.]

2040. FULTS, J. L., AND PAYNE, M. G.
Effects of 2,4-dichlorophenoxyacetic acid and maleic hydrazide on free amino acids and proteins in potato, sugar-beet, and bean tops.
Bot. Gaz., 1956, **118**: 130-3, bibl. 5.

Foliar spraying with 1,000 p.p.m. 2,4-D significantly decreased total free amino acids in pinto beans. Similar treatment with MH at 2,000 p.p.m., or with the two solutions combined, produced a negligible increase. Total protein was markedly decreased by all three treatments, particularly by MH alone.

2041. KULESCHA, Z.
Action de l'hydrazide maléique sur la teneur en auxine des tissus de topinambour cultivés en présence de diverses substances de division. **(The effect of maleic hydrazide on the auxin content of Jerusalem artichoke tissue cultured in the presence of various substances inducing proliferation.)**
Acta bot. neerl., 1955, **4**: 404-9, bibl. 19 [received 1957].

Artichoke tissue was cultured in media containing indoleacetic acid, tryptophane, 2,4-D or naphthoxyacetic acid, each combined with maleic hydrazide. MH inhibited the growth stimulation induced in each case by the hormones, but did not affect the auxin content of the tissue. It is concluded, therefore, that MH does not destroy the auxin but renders its utilization by the plant tissue impossible. The lack of specificity in the inhibiting action of MH suggests that it does not act on the growth substances themselves but on a single proliferation-inducing substance which is released by each of them.—Lab. Biol. veg. P.C.B., Paris.

2042. FLAIG, W., AND KAUL, R.
Über die Einwirkung von Ribonucleinsäure auf das Pflanzenwachstum. **(On the effect of ribonucleic acid on plant growth.)**
Z. PflErnähr. Düng, 1956, **72**: 103-13, bibl. 17.

In sterile culture on agar media ribonucleic acid and adenosin, at low concentrations, were found to increase the dry weight of lettuce plants, an effect which could not be accounted for by a rise of the adenosintriphosphoric acid (ATP) level in the plants. At high concentrations of ribonucleic acid the growth of lettuce was less than that occurring with inorganic phosphate nutrition. In open, non-sterile water culture ribonucleic acid had no growth promoting or inhibiting effect, except that its nitrogenous decomposition products contributed to the nitrogen nutrition of the plants.—Inst. Biochem. Bodens ForschAnst. Landw., Braunschweig-Völkenrode.

2043. ZIMMERMAN, P. W., AND OTHERS.
The preparation and plant physiological activity of 1,3-benzodioxole-2-carboxylic acids.
Contr. Boyce Thompson Inst., 1957, **18**: 453-62, bibl. 13, illus.

1,3-Benzodioxole-2-carboxylic acid (BCA) and three chloro-substituted derivatives were prepared and tested for plant hormone-like activity. When applied to tomato plants as test objects, BCA and its 4,6-dichloro-substituted derivative caused epinasty of leaves, curvature of stems, proliferation of stem tissue, modification of leaves, parthenocarpy, formation of adventitious roots, and stunting or killing with the higher concentrations. Though not so active from a concentration standpoint as 2,4-dichlorophenoxyacetic acid (2,4-D), the plant responses were similar. Threshold concentrations required in aqueous sprays for the different responses were as follows: modification of leaves, 0·001%; epinasty, 0·005%; bending and proliferation of stems, 0·05%; and inhibition, 0·5%. The 4,6-dichloro derivative had about the same plant physiological activity as BCA. The 5-chloro derivative was slightly less active. There were varying degrees of susceptibility among the 21 different species of plants treated. [Authors' summary.]

2044. SINGH, J. P., AND HAMNER, C. L.
The relation of chemical structure to biological activity in certain organic compounds.
Indian J. Hort., 1956, **13**: 109-40, bibl. 36, illus.

The cucumber root test was used to screen aromatic organic compounds containing a hydroxyl group or an acid group, or both, and metal chelating compounds for growth regulating activity. Aromatic compounds that most effectively stimulated root growth of cucumber seedlings were: 1-hydroxy-2-naphthoic acid, 3-hydroxy-2-naphthoic acid, 4,4′-methylene-bis-3-hydroxy-2-naphthoic acid and its disodium salt, 1-naphthol, 2,4-dichloro-1-naphthol, and 4-chloro-1-hydroxy-2-naphthoic acid. Root growth was inhibited by 1-naphthoic acid, 6-quinolinecarboxylic acid, quinaldinic acid, 2-picolinic acid, 2-naphthoic acid and 1-hydroxy-2-acetonaphthone. Certain metal chelate compounds were also found to stimulate or inhibit cucumber root growth. An attempt was made to correlate the structures and activities of the tested compounds, and it is suggested that the aromatic organic compounds may act as metal chelates.—Ind. agric. Res. Inst., New Delhi, and Mich. St. Univ., E. Lansing.

2045. SINGH, J. P.
Activity in certain organic compounds on the abscission.
Indian J. Hort., 1956, **13**: 165-80, bibl. 24, illus.

Concentrations of 10, 100 and 1,000 p.p.m. of 2,3,5-triiodobenzoic, 4,4′-methylene-bis-3-hydroxy-2-naphthoic, 1-hydroxy-2-naphthoic and 3-hydroxy-2-naphthoic acids applied in lanoline to the cut surface stimulated the abscission of debladed *Coleus* petioles. The rate of abscission was directly proportional to the dosage applied. When 2,3,5-triiodobenzoic acid 1,000 p.p.m. was applied simultaneously on the debladed petioles with either 4,4′-methylene-bis-3-hydroxy-2-naphthoic acid 10 p.p.m., 3-hydroxy-2-naphthoic acid 100 p.p.m., or 1-hydroxy-2-naphthoic acid 1,000 p.p.m., increased stimulation of abscission was noted. When 2,3,5-triiodobenzoic acid 1,000 p.p.m., 4,4′-methylene-bis-3-hydroxy-2-naphthoic acid 10 p.p.m., 3-hydroxy-2-naphthoic acid 100 p.p.m., or 1-hydroxy-2-naphthoic acid 1,000 p.p.m. was applied midway between the abscission zone and the cut surface with naphthaleneacetic acid 100 p.p.m. applied on the tips of debladed petioles, the response to naphthaleneacetic acid was reduced. A similar action was recorded when these materials were applied in a spiral fashion, thus indicating that they have anti-auxin properties. The compound 1-naphthoic acid at a 10 p.p.m. concentration applied on the outer surface of debladed petioles delayed the abscission of *Coleus* petioles. However, 1,000 p.p.m. concentration was found to accelerate the abscission. [From author's summary.]—Ind. agric. Res. Inst., New Delhi.

2046. HALL, W. C., AND LIVERMAN, J. L.
Effect of radiation and growth regulators on leaf abscission in seedling cotton and bean.
Plant Physiol., 1956, **31**: 471-6, bibl. 17.

With light-grown seedlings, chemical treatments had a more pronounced effect upon petiole abscission than did darkness, low intensity room light, red, far-red or fluorescent light. The promoting effect of ultra-violet light upon abscission is believed to be due to injury and to IAA inactivation. Both light quality (wave length) and irradiance were shown to have a significant effect upon abscission. With dark-grown bean seedlings removal of the apical meristem had no effect upon abscission. The slight abscission promoting effect of far-red radiation was small compared to the stimulating effect of chemicals. Reversibility of a red-far-red reaction in abscission was not conclusively proven and it appears that the red-far-red effect is only a part of the total abscission response system. These experiments do not support the belief that abscission is solely an auxin mediated response. [From authors' summary.]—Texas A. and M. College, College Station.

2047. MARRÈ, E., AND DUGNANI, C.
Ricerche sull'azione inibente di alcune antiauxine sull'attività di deidrogenasi delle frazioni solubile e mitocondriale di estratti di tessuti di piante superiori. (**Studies on the inhibiting action of certain antiauxins on the dehydrogenase activities of soluble and mitochondrial fractions of tissue extracts from higher plants.**) [English summary ½ p.]
Nuovo G. bot. ital., 1954, **61**: 214-38, bibl. 38 [received 1957].

Extracts from tissues of cauliflower, pea and Jerusalem artichoke were treated with trans-cinnamic acid, diphenylacetic acid, 2,4-dichloroanisole, phenylpropionic acid and maleic hydrazide, all of which inhibited dehydrogenase activity at concentrations of 60–400 p.p.m.—Ist. bot., Univ. Milan.

2048. AUDUS, L. J., AND BROWNBRIDGE, M. E.
Studies on the geotropism of roots. I. Growth-rate distribution during response and the effects of applied auxins.
J. exp. Bot., 1957, **8**: 105-24, bibl. 18, illus.

In experiments with pea seedlings over-all growth rates of gravity-stimulated radicles were considerably reduced during the phase of positive curvature and returned slowly to normal during recovery. Both sides of the root were stimulated to 30–40% increase in positive curvature rate, with a comparable decrease in reaction time, by low-concentrations of IAA and 2,4-D, but high concentrations (10^{-8} IAA and 3×10^{-8} 2,4-D) reduced curvature rates by 50% and increased reaction time.—Bedford Coll., London.

Tissue culture.

(*See also* 2041, 2088m, w, 2593.)

2049. Nitsch, J. P., and Nitsch, C.
Auxin-dependent growth of excised *Helianthus tuberosus* tissues. I.
Amer. J. Bot., 1956, **43**: 839-51, bibl. 48, illus.

Detailed studies were carried out on the techniques used with *in vitro* tissue culture of Jerusalem artichoke tubers. It was shown that the increase in fresh weight at a given auxin level was mainly influenced by the concentrations of K, nitrate and carbohydrates. The results obtained were used to establish a formula of a basic mineral medium which allows an inoculum of 15 mg. fresh weight to increase its weight 10 times in 21 days. Glucose increased growth further when it was autoclaved with the medium. Among the natural auxins studied, IAA and its ethyl ester were about equally active. *Cis*-cinnamic acid was active at a concentration nearly 1,000 times higher than that of IAA, whereas its trans-isomer was inactive by itself and reduced the growth caused by IAA.—Cornell Univ., Ithaca, N.Y.

2050. Caplin, S. M.
Variability of carrots to auxin, casein hydrolysate and coconut milk.
Amer. J. Bot., 1956, **43**: 749-54, bibl. 23.

Explants from different carrot roots were cultured in White's basal medium and basal media containing IAA or coconut milk (CM), with or without enzymatically hydrolysed casein (CH). After 14 days, growth in IAA media was about twice, and in CM media 8 times, that in control media. The presence of CH further increased growth in all media. Individual carrots differed in their responses to IAA, CH and CM. Approximately 20% of the carrots tested did not respond to IAA or CH, but all responded to CM in varying degrees.—Calif. Inst. Techn., Pasadena.

2051. Hildebrandt, A. C., Riker, A. J., and Muir, E.
Growth *in vitro* of marigold and tobacco tissue with nucleic acids and related compounds.
Abstr. in *Phytopathology*, 1957, **47**: 16.

Tobacco tissue of normal origin from the hybrid *Nicotiana glauca* × *N. langsdorffi* and marigold tissue of crown gall origin were grown in chemically defined media with the addition of nucleic acids, their components, or the antimetabolite thiouracil. Growth was stimulated by both filtered and autoclaved ribose nucleic acid (RNA) at 400 and 4,000 mg./l., whereas desoxyribose nucleic acid (DNA) had no effect at low levels and was inhibitory at 4,000 mg./l. RNA was an excellent source of nitrogen for the tobacco tissue but not for marigold tissue. DNA was not a good source of nitrogen for either tissue. Neither RNA nor DNA was a source of carbon for tobacco tissue. Tobacco tissue was inhibited by 400 mg./l. adenine, cytosine, xanthine, thymine or uracil, whereas hypoxanthine, guanine and ribose supported progressively more growth with increasing concentrations. Marigold cultures were inhibited by 400 mg./l. of all the purines and pyrimidines; adenine and guanine were the most inhibitory. Some stimulation occurred with low concentrations of cytosine, guanine, uracil and ribose. Thiouracil was inhibitory to tobacco cultures at 10 or more mg./l. and marigold cultures at 100 mg./l. Amounts of RNA that inhibited or stimulated these cultures, respectively, appeared comparable to the amounts inside stimulated or inhibited tobacco leaves infected with tobacco mosaic virus.

Seeds.

(*See also* 2087h, 3003, 3024i.)

2052. Voderberg, K.
Über Hemm- und Förderstoffe aus keimenden Samen. **(Growth inducing and inhibiting substances from germinating seeds.)**
Albrecht-Thaer-Arch., 1956, **1**: 22-40.

Observations were made in 10 c.c. distilled water in petri dishes of 10 cm. in diameter. Seeds inserted in the dishes generally emitted brownish substances, which in low concentrations often stimulated, and in high concentrations inhibited, germination and root growth initiation in seeds of the same sort. The emission was very small in *Agrostemma* and *Phacelia*, and in consequence stimulation of root initiation occurred when they were placed in association with other seeds, whereas it was considerable in *Vicia villosa* with resulting inhibition of growth. The inhibition primarily depends on the emission of substances from the seed coats, being strongest on the 1st and 2nd days, after which it weakens and may even change to stimulation on the 3rd day. From the 2nd day onwards inhibiting substances are also emitted from the inside of the seeds. The young developing roots emit no appreciable inhibiting substances. Excised embryos of *V. villosa* emit inhibiting substances for several days, but in the case of seeds still in their coats in the initial stages they only reach the seed bed in small quantities. Dormant seeds emit less inhibiting substances than those about to germinate. The inhibiting solutions lose their effect on long standing, but they are thermostable and insoluble in both ether and isopropanol. Since materials which cause fluorescence in the presence of isopropanol move about on paper chromatograms, those which occur in *Vicia* do not really belong to the inhibitory matter complex. The correlation between fluorescence and inhibitory effect which Kugler found in *Sinapis* does not generally hold good. On the other hand the correlation between colouring matter and inhibiting effect, noted by Niemann in the fruits of fennel, holds good for *Vicia villosa* seeds also. The inhibitory substances are not active in the seed bed chiefly owing to absorption by soil. Their activity is, moreover, removed by activated carbon. [Author's summary.]

2053. Garrard, A.
The effect of fruit sap on the germination of four species of tropical plants.
Gdns' Bull. Singapore, 1956, **15**: 276-84, bibl. 3.

Freshly washed and dried seeds of *Fagraea fragrans* do not germinate on filter paper in distilled water, but if a diluted extract of the berry sap is added 90–96% germination will be obtained in 12–14 days. The "active principle" causing germination is filterable and thermostable at 100° C.; it is not an auxin, nor is it associated with pH. Germination can also be induced in washed dried seeds by refrigeration at 10° C. for 1–21 days before sowing. The washed dried seeds of *Muntingia calabura* give 61·5% germination on filter paper in distilled water when fully ripe, but germination is inhibited by sap extracts from its own fruit. Germination of the seeds of *Melastoma malabathricum* is unaffected by sap extracts from the fruit. Germination of the seeds of *Duranta plumieri* is inhibited by berry extracts at high concentrations but unaffected at lower concentrations. Tests on the effect of alien sap on seed germination indicate that the active principle affecting germination is probably the same in all cases.

Nutrition.

(*See also* 2033, 2088j, p, 2342p, 2516, 2519, 2557e.)

2054. Canada Department of Agriculture.
Fertilizers for various crops.
Publ. Canada Dep. Agric. **870**, revised 1956, pp. 23.

The nutrient requirements in different Provinces of particular vegetables, of small and top fruits and of tobacco are considered. The elimination of various mineral deficiency symptoms in orchard soils is discussed. Particular attention is given to tobacco needs, according to whether one is concerned with flue-cured, burley or dark tobacco and with seedbeds or the growing crop.

2055. Beeftink, W. G., and others.
Voeding van de plant via het blad. (**Nutrition of the plant through the leaf.**) [English summary 17 lines.]
Meded. Dir. Tuinb., 1957, **20**: 150-7, bibl. 5.

In various parts of the Netherlands experiments have been carried out on numerous fruit, vegetable and ornamental crops to discover the extent to which foliar sprays of nutrients can correct nutrient deficiencies. The general conclusion is that acute deficiency symptoms may be considerably reduced, but not effectively controlled, by such sprays.

2056. Teubner, F. G., and others.
Some factors affecting absorption and transport of foliar-applied nutrients as revealed by radio-active isotopes.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 398-415, bibl. 28, illus.

Isotopic tracers were used to evaluate some factors which affect foliar absorption and transport of nutrients. Leaves of the bean were more retentive of nutrient sprays, and absorption was more rapid than with tomato leaves. Both upper and lower leaf surfaces function in absorption by mechanisms which are not clearly defined. Absorption of nutrients by leaves is generally greater during daylight hours or if plants are exposed to light. Sucrose added to solutions applied to leaves reduces absorption, but it enhances nutrient transport from leaves if plants are low in sugar. Temperature optima for utilization of foliar sprays are about 21° C. for P and 25 to 30° C. for K and Rb. Q$_{10}$ values for absorption and transport below these optima range from 2 to 3. Maximum foliar uptake of P occurred with solutions at a pH of 2 to 3 and with ammonium as a carrier. K absorption was highest from solutions at a pH of 8. Surface active (wetting) agents added to solutions applied to leaves reduced adherence and markedly depressed P absorption. High nutrient intensities and levels of P in root media depressed the total percentage of P derived from foliar applications to the plant. [Authors' summary.]

2057. Guljakin, I. V., and Judinceva, E. V.
The uptake of radioactive isotopes by plants through the leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **111**: 709-12, bibl. 1.

Sr^{90}, Ru^{106}, Cs^{137} and Ce^{144} applied to single leaves of sunflower and bean plants at 0·5 ml./leaf were absorbed and translocated to all aerial plant parts. Of the 4 elements radiocaesium was translocated most readily and was found in largest quantities in all organs including bean seeds.

2058. Helder, R. J., and Bonga, J. M.
The influence of light on the loss of labelled phosphorus from bean leaves.
Acta bot. neerl., 1956, **5**: 115-21, bibl. 12, illus.

Young bean plants were allowed to absorb a definite amount of labelled P from a Hoagland solution, and redistribution was studied while the plants were in a minus-P nutrient solution. There was an initial increase in P content in test leaves, followed by a decrease until a constant level was reached. This decrease could be stopped and even reversed by placing the test leaves in the dark, irrespective of the light conditions of the rest of the plant. A further loss, however, could be obtained by darkening the other parts of the plant; subsequent illumination caused another increase in P content of the test leaves.—Bot. Lab., Groningen.

2059. Sutcliffe, J. F.
The selective uptake of alkali cations by red beet root tissue.
J. exp. Bot., 1957, **8**: 36-49, bibl. 18.

In a series of experiments with beet tissue in solutions of alkali-metal chlorides, Na and K were absorbed almost equally from equimolar single-salt solutions, but when they were mixed K absorption was markedly reduced. The Na/K uptake did not fall below unity until the concentrations of Na and K in the mixture were adjusted respectively to 0·002 M and 0·1 M. Absorbed K was slightly more readily released than Na by H or Ca, but resisted the action of Rb and Cs and was readily released by Li. Absorbed Na was released more readily by Li than by H or Ca, and still more easily by K, Rb and Cs. Uptake of K was reduced markedly by Na and slightly by Rb and Cs, but was initially increased by Li. Uptake of Na was unaffected by Li; after some time it was depressed by K, Rb and Cs, the last named causing complete cessation after 48 hr. Uptake of Rb was temporarily increased by Li, reduced considerably by K and Cs and strongly by Na. Uptake of Li and the naturally slow uptake of Cs were reduced by each of the other 4 cations.—King's Coll., London.

2060. Garber, K., and Lichte, H. F.
Tradescantia fluminensis Vell. als Testpflanze für Nährstoffmangelversuche. **(*Tradescantia fluminensis* as an indicator plant for nutritional deficiencies.)**
Gartenbauwiss., 1956, **3**: 85-90, bibl. 16, illus.

In trials at Hamburg *Tradescantia fluminensis* was found to be an excellent indicator plant for mineral deficiencies. It not only reacts fairly quickly to various deficiencies (in about 3 weeks), e.g. P, K, Ca, N and B, but is also very susceptible to the ill effects of such deficiencies. It should be possible to develop quantitative tests. Further trials are necessary both for this purpose and to determine how the plant reacts to the absence of other major and minor elements. For want of a Mn-free nutrient solution there have been no trials as yet on Mn deficiency. The trials have shown that processed lime [Hüttenkalk] as compared with calcium carbonate contains a fair amount of boron and considerable quantities of soluble phosphates.—Staatsinst. angew. Bot., Hamburg.

Soil management and irrigation.

(*See also* 2087r, 2088c, f, v, 2158, 2995 l, 3011.)

2061. Dunn, S., and Latimer, L. P.
The influence of waste bark on plant growth [Suppl.]. The comparative value of bark as a surface mulch for apples, blueberries, and raspberries.
Stat. Bull. N.H. agric. Exp. Stat. **435**, 1956, pp. 1-17, bibl. 7 and pp. 18-19 respectively.

Experiments are reported on the use of waste bark from the paper mills for use in the glasshouse and in the open on various plants. Considerable success attended the use of old bark, with or without fertilizers, as a soil amendment for antirrhinums, cabbages, tomatoes, vine cuttings and geraniums in the glasshouse. As a mulch for roses in the glasshouse it proved very successful. Its use did not affect scab incidence in apples. Shredded bark compared favourably with sphagnum peat as a packing material for live plants. It also showed promise as a mulch or soil amendment for flowers and vegetables in the open. Results of the use of bark as a surface mulch were inconclusive for apple trees in the open, were very promising for blueberries and were somewhat doubtful for raspberries. In raspberries, however, more suckers were produced in the softwood bark-mulched rows than in others cultivated or mulched with hay or straw. This might be an advantage for the nurseryman.

2062. Bollen, W. B., and Lu, K. C.
Effect of Douglas-fir sawdust mulches and incorporations on soil microbial activities and plant growth.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 35-41, bibl. 13.

Dry-weight yields are analysed for 3 successive greenhouse crops (sunflower, barley, sunflower) grown in silty-clay loam treated with 10 or 100 tons per acre of Douglas-fir sawdust, ponderosa pine sawdust, old Douglas-fir bark or rye straw, alone or combined with sufficient ammonium nitrate to reduce the C/N ratio to 50 or, in the 10-ton treatments, to 20. Without added N the only treatment not causing first-crop yield depression was 10 tons of Douglas-fir sawdust, but (except with rye straw) all these depressions were more than counteracted by N addition. Residual yield stimulation varied greatly among treatments. Brief reference is made to findings of other authors on sawdust manuring and mulching of tomatoes and strawberries. General recommendations are made for amounts and times of applying inorganic N as a supplement to sawdust.—Ore. agric. Exp. Stat., Corvallis.

2063. van Drenth, A.
Elektrische grondverwarming met behulp van gaas. **(Electric soil warming by means of wire netting.)** [English summary 15 lines.]
Meded. Dir. Tuinb., 1957, **20**: 91-8, illus.

The layout and use of wire netting as a heating element in electric soil warming is described. The voltage used is 42 V, and directions are given for its use in soils of high, normal and low acidity. The system has shown promise in forcing chicory, raising endive and tomato plants, and rooting cuttings of *Sansevieria*, carnations, *Ficus* and azaleas.—Inst. Tuinbouwtech., Wageningen.

2064. Vittum, M. T., and Peck, N. H.
Soils and methods used in irrigation experiments at Geneva, N.Y.
Bull. N.Y. agric. Exp. Stat. Geneva **775**, 1956, pp. 56, bibl. 9, illus.

A highly technical bulletin giving information on the morphological, physical and chemical characteristics of the soil in the area, on methods of measuring soil water and calculating results preparatory to extensive irrigation trials on vegetables.

2065. Hudson, J. P.
Plants and their water supplies.
Endeavour, 1957, **16**: 84-9, bibl. 9, illus.

The author discusses how best a solution can be obtained to the questions: (1) When should water be applied? (2) How much water is needed? and (3) How can one minimize damage to soil structure when applying water? The third question has been answered by the irrigation engineers. A new approach to the second question has been found by Penman and others in recent years who have shown that the rate of moisture loss from a soil can be deduced from a study of readily recorded meteorological data such as hours of sunshine and rate of precipitation. These enable the farmer to be advised of the amount of water necessary to ensure adequate economic rewetting of the soil. But the key to successful irrigation still lies in an answer to the first question. Critical experiments on individual crops appear to be an essential prelude to a satisfactory answer. The author gives some details of relevant work at Sutton Bonington with lettuce and tomato plants.

2066. Rider, N. E.
Water losses from various land surfaces.
Quart. J. roy. met. Soc., 1957, **83**: 181-93, bibl. 11.

An account is given of observations designed to evaluate the daily water losses from surfaces carrying crops of different size and shape which were transpiring at their potential rates. The losses were obtained by the familiar aerodynamic method, the observations being made over bare soil, brussels sprouts, peas and grass. It is shown that the differences in the water losses from the various surfaces are too large to be accounted for by likely errors in the observations or method. Typical losses for sunny days in the period May to July 1955 were: peas, 2·5 to 7·5 mm.; grass 2 to 3 mm.; brussels sprouts about 4 mm. [Author's summary.] In his conclusions the author suggests that the concept of equal potential transpiration, irrespective of crop size or character, should be approached with the utmost caution.—Met. Off., London, and Sch. Agric., Univ. Cambridge.

2067. California Agriculture.
Irrigation in California.
Calif. Agric., 1957, **11**(4): 2-40, illus.

This issue contains 24 progress reports on research in California into problems of agricultural irrigation. Most of the articles are concerned with the mechanics of irrigation, but 2 are of more specific horticultural interest; of these one has been abstracted separately [see abstract 2158], and the other, by O. R. Lunt, discusses irrigation in ornamental crop production.

2068. Bean, G., and Wells, D. A.
Controlled water application in glasshouses. [French, German and Spanish summaries, 11 lines each.]
J. agric. Engng Res., 1957, **2**: 123-34, bibl. 9, illus.

The drip-feed and low-level-sprinkling systems of applying water at controlled rates per plant have been studied at Wrest Park and are described in detail. Under commercial conditions both systems reduce labour requirements and simplify watering. With low-level sprinkling a more uniform and larger rooting volume is obtained than with the drip-feed system.—Nat. Inst. agric. Engng, Silsoe, Beds.

Glasshouses.

(*See also* 2087d, 2088h, t, 2556p.)

2069. de Zeeuw, A., and van Nes, A. R.
Wanneer zijn verrolbare glasopstanden economisch verantwoord? **(When is the use of mobile glasshouses economically justified?)** [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 76-90, 111, illus.

Considerable differences were found in initial and running costs of various types of static and mobile glasshouses and of mobile frames in a study in the Venlo district. On the basis of these figures the authors consider the conditions under which the construction of a comparatively expensive type of glasshouse is economically justified. Finally the use of mobile glasshouses in several Dutch horticultural centres is discussed in relation to economic factors.

2070. Germing, G. H.
In hoeverre is automatisering bij de kasteelten mogelijk? **(To what extent is automation of glasshouse growing possible?)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1957, **20**: 162-6, illus.

Automatic control of glasshouse climate is discussed. An electrically-operated ventilating system and a system which regulates temperature according to light intensity are described. A mobile steam plough has given good results in soil sterilization.

2071. Seemann, J.
Wärmeregelung in geheizten Gewächshäusern nach ökologischen Gesichtspunkten. **(The regulation of temperature in heated glasshouses from an ecological standpoint.)**
Gartenbauwiss., 1956, **3**: 102-28, bibl. 11, illus.

Trials are reported for the 1953/54 and 1954/55 seasons with a newly developed heating apparatus for glasshouses, the Luvatherm Regulator, in comparison with the normal apparatus which maintains a constant temperature. From a physiological standpoint the maintenance of constant temperature cannot conduce to optimum growth conditions since it disregards the temperature : light relation. The Luvatherm apparatus on the contrary regulates temperatures in accordance with light conditions and ensures a lower temperature by night than by day. This results in better carbohydrate assimilation conditions by day and restricted respiration at night. Under test conditions not only did the use of Luvatherm allow an overall saving of up to 40% in heat used, but it also resulted in better development of the test plants, beans, lettuce, tomatoes and primulas. Constant temperatures proved unsatisfactory for reproduction. With Luvatherm the plants had more flowers, set more fruit and cropped more heavily. On the other hand in a "constant heat" house—as the result of a higher average day temperature—fruit ripening was somewhat earlier. Light : temperature relations are most important for vegetative growth. Plants grown under Luvatherm régime were darker green and of stockier growth than those grown at constant temperatures. Poor light and relatively high temperatures led to etiolation. Poor light with low temperature checked growth in length. Good light and a correspondingly high temperature resulted in strong healthy growth. The Luvatherm is illustrated and described. [From author's summary.]

2072. Vogel, G., and Flemming, G.
Vorläufiger Bericht über die Eignung der in der DDR hergestellten Plaststoffe für den Gartenbau. **(Preliminary report on the horticultural use of plastics manufactured in East Germany.)**
Dtsch. Gartenb., 1957, **4**: 60-2, bibl. 1, illus.

Light transmission through 3 types of plastic has been compared with that through glass. Growth and yield of gherkin plants were improved under Perfol frames compared with those in the open, but this material did not stand up to weathering.—Inst. Gartenb., Grossbeeren.

2073. Krouch, E. D.
Collapsible greenhouse tables.
Amer. Nurserym., 1957, **105**(3): 14-15, illus.

Diagrams and details of construction are given of collapsible greenhouse benches, designed to carry boxed plants to prevent their rooting through the boxes into the soil.

2074. Spoelstra, P. A.
Centralisatie van ketelhuizen. **(Centralization of boiler houses.)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1957, **20**: 159-61, 166, illus.

In spite of high costs of investment, it is considered an advantage to have one central boiler house on a nursery rather than separate boilers for each glasshouse. Automatic stoking, long distance flow and return pipes, and small-diameter heating pipes can all reduce fuel costs.—Inst. TuinbTechniek, Wageningen.

Machinery and apparatus.

(*See also* 2087 l, n, p, v, w, 2088k, 2108, 2212, 2213, 2223, 2224, 2256, 2257, 2380k, 2556q, 2615b, 2926, 2971, 2978, 2993g, 2995d, l.)

2075. The Commercial Grower.
Mechanisation in Horticulture, Spring 1957, No. 7, pp. 24-66, illus.

In this issue of the periodical are included articles on: mechanisation in field planting; the pallet technique in fruit harvesting; mechanisation as an aid to good management; pre-pack machinery; the use of rollers, trailers and elevators; automatic irrigation for glasshouses; and the use of electricity.

2076. Bronštejn, I. I.
A single-seed drill for frames. [Russian.]
Sad i Ogorod, 1957, No. 2, pp. 28-9, illus.

An illustrated description is given of a new hand drill SOP-43 which sows single vegetable seeds 3 or 6 cm. apart across the width of frames or seed beds. The implement is 129 cm. long, weighs 11 kg. and is operated by 2 workers at a rate 2·3–3·5 times faster than hand sowing.

2077. Singh, S. M., Rogers, W. S., and Slater, C. H. W.
Mist propagation frames for leafy cuttings.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 54-9, bibl. 3, illus.

The development and installation of hydrostatically controlled mist propagation frames for use outdoors are described. Factors investigated, which affect the efficiency of water distribution, included: (i) the shape of the anvil which faces the nozzle orifice and atomizes the jet of water; (ii) the size of the gap between orifice and anvil; (iii) the size of nozzle in relation to water pressure and area to be covered; (iv) the effect of side shields; and (v) the position of the hydrostat which would most nearly maintain a thin water film on the cuttings. In tests on the rooting of cuttings, including apple softwood cuttings, factors studied were temperature, light, rooting medium and transplanting. It was found that shading with coir wind screening to reduce light intensity to half aided rooting by preventing scorching, and that equal parts of coarse sand and peat provided a satisfactory rooting medium.

2078. Ehrendorfer, K.
Lichtschränke für Vegetationsversuche. **(Artificially lighted cabinet for growth tests.)**
Bodenkultur, 1956, **9**: 168-74, bibl. 6, illus.

An account is given of successful growth tests with wheat, lettuce, rape and mustard in a cabinet where the only source of light was artificial. Philips tubes TL40 W/55, TL40/34 and TL20 W/34 were used. The intensity of the visible light was *ca.* 23 watts per sq. m. of research area or 3,600 lx. The relative spectral energy component of the artificial light is smaller in the yellow green range than that of sunlight.

2079. (Brown, O. A.)
Possibilities in shock treatment.
Agric. Res., Wash., 1957, **5**(7): 3-4, illus.

A note is given of an electrical device invented by the author and used in co-operative work at the Tennessee Experiment Station, Knoxville, for the treatment of seed for drying it or for promoting or inhibiting its germination.

2080. Rogers, M. N.
A small electrical hygrometer for micro-climatic measurements.
Abstr. in *Phytopathology*, 1957, **47**: 29.

A small-sized modification of the Dunmore electrical hygrometer was constructed and used to make direct relative humidity measurements as near the leaf surface as 0·75 mm. This remote-reading instrument removes almost negligible quantities of moisture from the air during use and may be used in still air or in small enclosed spaces. It reaches equilibrium with its environment within 1–3 minutes; with suitable indicating devices it measures R.H. reliably to an accuracy of 1% or better. By means of this instrument it was found that R.H. values near leaves increased when leaf temperatures were depressed below air temperature. Infection of snapdragons by *Puccinia antirrhini* and of tomato plants by *Cladosporium fulvum* occurred at 85% ambient humidity when leaf temperatures were below air temperatures.

2081. Trickett, E. S., Moulsley, L. J., and Edwards, R. I.
Measurement of solar and artificial radiation with particular reference to agriculture and horticulture. [French, German and Spanish summaries ¼ p. each.]
J. agric. Engng Res., 1957, **2**: 86-110, bibl. 17, illus.

A selenium photocell in conjunction with an electrolytic integrator was shown to be the most effective general purpose instrument for measuring the level of incoming solar energy. For more accurate measurements the Kipp Solarimeter in conjunction with an amplifier and one of several possible integrators appears to be the best system available at reasonable cost.—Nat. Inst. agric. Engng, Silsoe, Beds.

2082. Miller, E. E., Shadbolt, C. A., and Holm, L.
Use of an optical planimeter for measuring leaf area.
Plant Physiol., 1956, **31**: 484-6, bibl. 2, illus.

The optical planimeter described was designed to accommodate large areas and is particularly convenient for the measurement of leaf area. It is capable of rapid determination of irregular areas with high accuracy and is, therefore, suitable for use with many biological materials. [From authors' summary.]

Marketing.

(*See also* 2087c, s.)

2083. Committee on Horticultural Marketing.
Report of the Committee on Horticultural Marketing, H.M.S.O., Kingsway, Lond., 1957, being *Cmnd.* **61**, pp. 183, 6s.

A consideration of wholesale market facilities for horticultural produce in London and the possibility of improving them. It is of present value to the practising horticulturist both for the appendixes which show how the different commodities are dealt with, and for the information on the very numerous administrative and advisory bodies concerned.

2084. Allen, G. R.
The short-term behaviour of distributive margins on fruit and vegetables.
Fm Econ., Oxf., 1956, **8**(7): 1-16.

A consideration of distributive margins and retail margins on common fruits and vegetables appearing on the British market between 1925 and 1939 helps to substantiate the contention that distributive margins are inflexible compared with variations in growers' prices. Factors affecting the flexibility of margins are discussed in some detail and suggestions made on how to achieve greater flexibility.

2085. Abbott, J. C.
Marketing fresh fruit and vegetables in the Persian Gulf Area.
[*Stencil*] *FAO*/**56/10/7617**, Rome, 1956, pp. 24.

The author describes the phenomenal increase in imports of fruit and vegetables from such countries as Cyprus, Egypt, Ethiopia, Iran, Iraq, Jordan, Lebanon, Sudan, Syria and Turkey into countries affected by oil discovery, viz. Aden, Bahrein, Iraq, Kuwait, Oman, Qatar and Saudi Arabia. The difficulties concern transport, refrigerated storage depots and as yet, with a few exceptions, lack of co-ordinated effort. Possible methods of overcoming them are discussed.

2086. Hicks, E. W.
Some engineering aspects of fruit and vegetable handling.
Reprinted from *Food Tech. Aust.* [1956?], Vol. **8**, No. 12, pp. 4.

A discussion of the pros and cons of using refrigerated [cooled by ice or mechanically] or ventilated cars for fruit and vegetable transport in Australia, and of the added difficulty inherent in the use of cartons. Precooling problems, hydrocooling and vacuum cooling are also considered.

Noted.

2087.

a Andersen, P. E.
Lidt om smagsbedømmelser af frugt og grøntsager. (**On evaluating the flavour of fruit and vegetables.**)
Horticultura, 1957, **11**: 6-11.
A discussion of the problem in general terms.

b Behrens, W. U.
Bestimmung der radioaktiven Phosphorsäure in der lebenden Pflanze. (**Determination of radioactive phosphoric acid in living plants.**)
Sonderh. Landw. Forsch. **9**, 1957, pp. 68-74, bibl. 2, illus.

c Bennett, L. G.
Problems of prepacking horticultural produce.
Agric. Rev. Lond., 1957, **2**: 37-40.
Purposes, techniques and economics discussed.

d Bewley, W. F.
The British glasshouse industry.
J. roy. Soc. Arts, 1956, **104**: 515-24.
History and development, production and economic aspects.

e Bocchi, A., Lona, F., and Sachs, R. M.
Photoperiodic induction of disbudded *Perilla* plants.
Plant Physiol., 1956, **31**: 480-2, bibl. 5, illus.
Demonstrated by means of leaf grafting.

f Bömeke, H.
Über Wachstumsanomalien insbesondere an Obstfruchten. (**Abnormalities of fruit growth with particular reference to fruit species.**)
Mitt. ObstbVersuchsringes Jork, 1956, **11**: 298-310, bibl. 10, illus.
Phenomena with discussion of reasons thereof.

g Bradfield, E. G.
An improved formaldoxime method for the determination of manganese in plant material.
Analyst, 1957, **82**: 254-7, bibl. 5.
Developed at Long Ashton Res. Stat.

h British Drug Houses.
Tetrazolium salt. A reagent for determining the viability of seeds.
[*Publ.*] *British Drug Houses Ltd.*, Poole, Dorset [1957?], pp. 4, bibl. 10.
Method of use.

i Buchholz, W., and Stockey, F.
Der innerbetriebliche Transport. (**Transport in the nursery.**)
Dtsch. GartenbWirtsch., 1957, **5**: 10-12.
With particular reference to pricking-out boxes.

j Davis, J. R.
Evaporation and evapo-transpiration research in the United States and other countries.
[*Mimeo.*] *Evapotranspiration Cttee, Hydrology Group, Amer. Soc. agric. Engrs*, 1956, pp. 87.
A summary of research projects.

k Dionne, J. L., Robertson, G. W., and Holmes, R. M.
Agricultural meteorology. A brief literature review and bibliography.
[*Mimeo.*] *Exp. Fms Serv. Canada Dep. Agric.*, 1956, pp. 59, bibl. 578.

l Esau, P.
Construction and application of thermocouples for continuous temperature recording of tree buds and fruit.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 15-19, bibl. 4.

m Flood, A. E.
The development of chromatography.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 179-83, bibl. 3, illus.
A popular review reprinted from *Scientific Horticulture, 1955-56*, **12**: 110-17 [*H.A.*, 27: 1988].

n Gerhold, N. R., and Barmington, R. D.
A planter for experimental field plots.
Plant Dis. Reptr, 1957, **41**: 227-9, illus.
For uniform distribution of seed or inoculum.

o Gregory, F. G.
The place of plant physiology in fruit growing.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 41-8.
A review.

p Haswell, G. A., and Oxley, T. A.
A thermocouple spear for temperature measurement in stacks of bagged produce.
Trop. Agriculture Trin., 1957, **34**: 55-8, illus.
Can be used to a depth of 20 ft.

q Hodge, W. H., and Erlanson, C. O.
Federal plant introduction—a review.
Econ. Bot., 1956, **10**: 299-334, bibl. 13, illus.
History and achievements of U.S. Section of Plant Introduction [see also *H.A.*, 26: 1290].

r Innes, R. F.
The water relation of soils and plants.
J. Jamaican Ass. Sugar Tech. for 1954, **17**: 1-5.
An interesting review in non-technical language.

s Kahlon, A. S., and Randhawa, G. S.
Some considerations for research in marketing horticultural products in India.
Indian J. Hort., 1956, **13**: 198-205, bibl. 7.

t Knutson, K. E.
Flame-photometric determination of magnesium in plant material.
Analyst, 1957, **82**: 241-54, bibl. 29.

u Libbert, E.
Untersuchungen über die Physiologie der Adventivwurzelbildung. II. Mitteilung. Die korrelative Beeinflussung der Adventivwurzelbildung durch andere Organe, insbesondere durch die Wurzel. (**Studies on the physiology of adventitious root formation. II. The correlative influence of other organs especially the root, on adventitious root formation.**)
Planta, 1956, **48**: 157-89, bibl. 49.
Using etiolated pea plants.

v Long, I. F.
Instruments for micro-meteorology.
Quart. J. roy. met. Soc., 1957, **83**: 202-14, bibl. 10, illus.
Developed at Rothamsted exp. Stat.

w Maggs, D. H.
A photometer for estimating the area of samples of detached leaves.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 107-8, bibl. 2, illus.

x Marrè, E., and Servettaz, O.
Prime ricerche sulla fisionomia enzimatica caratteristica della fotosintesi. (**Preliminary studies on enzyme configurations characteristic of photosynthesis.**) [English summary ¼ p.]
Nuovo G. bot. ital., 1954, **61**: 378-83, bibl. 11 [received 1957].
Compared in green and etiolated pea leaves.

y Ničiporovič, A. A.
Photosynthesis and the theory of obtaining high yields. [Russian.]
Izd. Akad. Nauk S.S.S.R., Moscow, 1956, pp. 93, bibl. 84, roubles 3.65.
A review.

z Pallas, J. E., Jr., and Crafts, A. S.
Critical preparation of plant material for autoradiography.
Science, 1957, **125**: 192-3, bibl. 6, illus.
Methods of drying labelled bean seedlings compared.

2088.

a Reinhold, J., Heinecke, H., and Baumann, E.
Untersuchungen einiger Torfvorkommen im Süden der Deutschen Demokratischen Republik unter besonderer Berücksichtigung ihrer Eignung für gärtnerische und landwirtschaftliche Kulturzwecke. (**Studies of some peats in the south of the German Democratic Republic, with special reference to their uses in horticulture and agriculture.**)
Arch. Gartenb., 1956, **4**: 279-95, bibl. 13.

b Roberts, L. W.
Eliminating technically induced variations of the tetrazolium reaction in plant material.
Stain Tech., 1957, **32**: 98-9.

c Russell, M.
Select catalogue of literature on drainage, irrigation, soils in Griffith, Merbein, and Deniliquin libraries.
C.S.I.R.O., Griffith, N.S.W., 1956, pp. 195.
A useful compilation of more than 2,400 references.

d Saltman, P., and others.
The dark fixation of CO_2 by succulent leaves: the first products.
Plant Physiol., 1956, **31**: 464-8, bibl. 19, illus.

e Scharrer, K., and Munk, H.
Die quantitative Bestimmung kleinster Mengen Zink in Böden, pflanzlichen und tierischen Substanzen und Düngemitteln. **(The quantitative estimation of small amounts of zinc in soils, plant and animal material, and manures.)**
Z. PflErnähr. Düng., 1956, **74**: 24-42, bibl. 21.

f Scott, V. H.
Sprinkler irrigation.
Circ. Calif. agric. Exp. Stat. **456**, 1956, pp. 43, bibl. 3, illus.
Replaces *Circ.* 388; provides much useful information.

g Seibert, R. J.
Arboreta and botanical gardens in the field of plant sciences and human welfare.
Amer. J. Bot., 1956, **43**: 736-8.

h Sheard, G. F.
Glasshouse heating problems.
Agric. Rev. Lond., 1957, **3**: 40-4, bibl. 4.
How to reduce heating costs and control temperature.

i Sisakjan, N. M., and Filippovič, I. I.
Protein synthesis in isolated structures of the plant cell. [Russian, with English summary ⅓ p.]
Biohimija, 1957, **22**: 375-83, bibl. 15.
In beans and tobacco.

j Skelding, A. D.
The effect of carbon dioxide on the absorption of manganese by root tissues of red beet.
Ann. Bot. Lond., 1957, **21**: 121-41, bibl. 14.
Partial inhibition. [For earlier work see *H.A.*, 23: 1462.]

k Slavoňovský, F.
A portable self-recording instrument for measuring the tensile strength of roots. [Russian.]
Bot. Žurnal, 1957, **42**: 62-7, bibl. 2, illus.

l Sorokin, H. P.
Studies on living cells of pea seedlings. I. Survey of vacuolar precipitates, mitochondria, plastids, and spherosomes.
Amer. J. Bot., 1956, **43**: 787-94, bibl. 30, illus.

m Street, H. E.
Excised root culture.
Biol. Rev., 1957, **32**: 117-55, bibl. 160.
A detailed review with special reference to work on the tomato.

n Tepe, W.
Die Bestimmung des osmotischen Druckes von Erdlösungen an Hand von 19 gärtnerischen Kulturerden. **(The determination of osmotic pressures of soil solutions of 19 horticultural composts.)**
Gartenbauwiss., 1956, **3**: 320-5, bibl. 9.
The method was used with composts from ornamental plant nurseries.

o Thimann, K. V.
Growth and growth hormones in plants.
Amer. J. Bot., 1957, **44**: 49-55, bibl. 14, illus.
A review.

p Turno Rotini, O.
Le complesse interazioni della clorosi da ferro. **(The complex interactions of iron chlorosis.)**
Ital. agric., 1957, **94**: 217-30, bibl. 64.
A review.

q Ulrich, R.
Factors affecting the nutritive value of foods of vegetable origin.
Indust. aliment. agric., 1956, **73**: 609-20, bibl. 76, from abstr. in *J. Sci. Food Agric.*, 1957, **8**: i-100.

r Van Duyne, F. O.
How to prepare fruits and vegetables for freezing, with suggestions for choosing suitable varieties.
Circ. Ill. agric. Ext. Serv. **602**, revised 1956, pp. 16, illus.
For first edition see *H.A.*, 17: 486e.

s Verdier, E. T., Steyn, W. J. A., and Eve, D. J.
Determination of zinc in plants and soils.
J. agric. Food Chem., 1957, **5**: 354-60, bibl. 26.
Applied successfully to leaf samples of citrus, pineapple, etc.

t Versleijen, G. M. J.
De verrolbare bak. **(The movable frame.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1957, **20**: 233-4, illus.

u Vince, D.
Temperature requirements of horticultural crops.
J. roy. agric. Soc., 1956, **117**: 53-63, bibl. 44.
A review.

v Webb, F. W.
Chemical sterilization of soil in glasshouses.
Park Administ., 1957, **21**: 503-6.
Notes on the use and cost of several chemicals.

w Ziegler, H.
Frühjahrsblutungssaft als Nährboden für die Kultur isolierter Wurzeln. **(Spring sap as a nutrient medium for excised root culture.)**
Planta, 1956, **48**: 190-9, bibl. 8, illus.
Sap from trees and vines.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 2998, 3000, 3015, 3019.)

2089. Honan, N. D.
Trends in fruit consumption.
Quart. Rev. agric. Econ., 1956, **9**: 198-204.

The author discusses consumption figures from before the last war till 1955 for Australia, the U.S.A. and the U.K. In Australia the per head consumption of fresh fruit is lower than before the war, but the consumption of processed fruit has been maintained. There has been little enthusiasm for processed citrus juice either frozen or otherwise. Sections of the apple industry have preferred overseas to home markets and this has probably contributed to a decline in Australian apple consumption. In the U.S. higher living standards have been accompanied by higher consumption of fruit per head. This is largely due to a strong demand for processed fruits, especially processed citrus juice. In the U.K. total consumption in 1954 was almost identical with the annual average for 1934–8. Apple consumption had gone up probably owing to the greatly increased home production. Comparative figures for all, including processed, fruit consumption in the year 1954 are: U.S.A. 192·7 lb., Australia 161·1 lb. and U.K. 132·2 lb. per head. [See also note 2183a.]

2090. Hilkenbäumer, F., and Heiber, H.
Naturalerträge, Erzeugerpreise und Geldumsätze in Obstbaubetrieben des Amtsbezirkes Meckenheim. **(Yields, producer's prices and turnover in fruit farms in the Meckenheim district.)**
Gartenbauwiss., 1956, **3**: 250-9.

Yields and returns were studied on 44 apple farms in the Meckenheim district near Bonn, during 3 years. The average turnover increased as the area devoted to fruitgrowing increased. The highest prices were gained by Cox's Orange Pippin, and the lowest average prices by Early Victoria.—Inst. Obstb., Univ. Bonn.

2091. Slović, D.
Apple growing in Prespa. [Yugoslav, with English summary 2 pp.]
Annuaire Fac. Agric. Sylvic., Skopje, 1954/55 and 1955/56, **8** and **9**: 73-126, bibl. 16, illus.

The region called Prespa or Prespa Valley in the south-western corner of Yugoslavia is north of the lake Prespa which lies between Yugoslavia, Albania and Greece. It is a famous fruit growing area, with apples as the most important crop. A description is given of the topography and climate of the region, orchard area, distribution of fruit species and apple varieties. Altogether about 90 apple varieties occur, about 50 of which are indigenous, 34 European, 6 American and 4 Mičurin's. The 3 leading varieties, comprising 52% of the total grown, are the indigenous Prespanka (21%) and Tetovka (16%) and the American Delicious (15%).

Varieties and breeding.

(*See also* 2182g, p, u, 2999, 3008, 3010.)

2092. Brooks, R. M., and Olmo, H. P.
1956's new fruit varieties.
Amer. Fruit Gr, 1957, **77**(1): 30-1, 34-7, illus.

New varieties patented in 1956 are briefly described, viz., 6 apples, 1 apricot, 3 blueberries, 1 cranberry, 1 fig, 5 nectarines, 1 olive, 9 peaches, 1 pear, 4 pecans, 5 raspberries, 10 strawberries and 3 walnuts.

2093. Oberle, G. D., Moore, R. C., and Judkins, W. P.
Fruit varieties for Virginia.
Bull. Va P.I. agric. Ext. Serv. **240**, 1956, pp. 28.

Not only varieties but also certain cultivation problems are discussed with regard to the main tree and bush fruits grown in Virginia. Figs, persimmons and blueberries are included.

2094. Samsonova, V. P.
Some results of top and small fruit variety trials in the R.S.F.S.R. [Russian.]
Sad i Ogorod, 1957, No. 2, pp. 34-8, illus.

A critical assessment of work carried out between 1947 and 1956 at 87 state variety trial plots in 49 regions on 15 kinds of fruit, involving over 1,200 varieties. Notes are given on the frost resistance of species and varieties grown on certain plots during the severe winter of 1955/56.

2095. Scottish Horticultural Research Institute.
Report for the period 1952-1956 on the apple variety collection and the apple variety 'elimination' trial at Mylnefield.
[*Mimeo.*] *Scot. hort. Res. Inst., Mylnefield, Invergowrie, Dundee*, **DE3773/1**, 1957, pp. 41.

The variety collection, started in 1952, now consists of 679 varieties, each represented by a single bush tree on M.IX stock. They are here listed together with source of scion. Notes are given on management, and cropping records for 1954–56 are tabulated. Data are being collected on growth, time of flowering, fruit quality and pests and diseases, but these are not recorded here. The variety elimination trial was started in 1953 to furnish an initial assessment of varieties of fairly recent origin which have had little or no trial in Scotland hitherto. It now contains 103 varieties mostly on M.I, M.II, M.IV and M.VII rootstocks. The varieties are listed and tables summarize tree vigour, cropping and influence of rootstock on cropping. A report is also given by A. E. Joyce on the flavour of some dehydrated and reconstituted cooking varieties.

2096. Duggan, J. B., and Williams, R. R.
Cider apples. A revised list of recommended varieties.
Agriculture, Lond., 1957, **64**: 11-15.

A list of 26 recommended cider apple varieties is based on reports prepared for the Cider Advisory Committee of the Long Ashton Research Station, and gives time of blossoming, suitable pollinators, size and habit of tree and cropping season. Eight varieties are recommended for general planting (only Chisel Jersey being added to the previous 1947 list), 13 for limited planting and 5 for special purposes. J.R.L.

2097. PRESTON, A. P.
Growth and cropping of some new dessert apples.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 81-4, bibl. 4.

Three dessert apple varieties, bred at East Malling, were planted with standard varieties of comparable season, on M.VII and M.II rootstocks, in field trials in 1946. The varieties were Harvest (Devonshire Quarrenden × Worcester Pearmain), Tydeman's Early Worcester (McIntosh Red × Worcester Pearmain), and Tydeman's Late Orange (Laxton's Superb × Cox's Orange Pippin) compared with Beauty of Bath, Worcester Pearmain and Laxton's Superb. Data are presented on tree size, time of blossoming, time of picking, total crop, fruit size and regularity of bearing. Harvest, an early red apple, ripened about 10 days after Beauty of Bath. Early Worcester ripened 9 days later than Harvest and 14 days before Worcester Pearmain. Late Orange was picked at the end of October and its season follows that of Cox's Orange Pippin. [Author's summary.]

2098. ANJOU, K.
Undersökningar över C-vitaminhaltens nedärvning hos äpple. **(Studies on the inheritance of vitamin C content in apples.)** [English summary 8 lines.]
Sver. pomol. Fören. Årsskr, 1956, 1957, pp. 61-8, bibl. 14.

Investigations suggest that vitamin C content in apples is a partly dominant character determined by several genes. There is some hope that systematic breeding may lead to the production of apple varieties with a vitamin C content approaching that of oranges.—Balsgård.

2099. BISHOP, C. J.
Genetic changes in apples induced by thermal neutrons.
Canad. J. Plant Sci., 1957, **37**: 55-8, bibl. 9.

Sectorial colour changes in Cortland apples showed a marked increase over controls following irradiation of the dormant scions with a 2–8 hours' exposure to thermal neutrons. This type of atomic radiation appeared to be much more effective than were x-rays in producing gene mutations. Both sectorial and complete colour sports were found, the latter being very dark red and readily distinguishable from the colour of the normal Cortland. About 5 hours' exposure with a thermal neutron dosage of about 13×10^{12} neutrons per cm.^{2} appeared to be the optimum treatment for this apple variety. [Author's abstract.]—Exp. Fm, Canada Dep. Agric., Kentville, N.S.

2100. VOLKOVA, N. K.
Inheritance of quality and characteristics of Aport in the hybrid progeny, and changes in them due to mentor effect. [Russian.]
Agrobiologija, 1956, No. 5, pp. 62-9.

Aport, the leading apple variety in the Alma-Ata region of Kazahstan, was crossed with 3 wild forms and 9 other varieties. The vegetative and fruit characteristics of the hybrids are described and rootstock effects are noted.

2101. LAPINS, K., AND NASH, S. W.
Discriminant function analysis in identification of peach varieties in nursery trees.
Canad. J. Plant Sci., 1957, **37**: 12-25, bibl. 12.

Discriminant function analysis was applied to test the possibility of identifying 5 peach varieties from nursery trees which had been measured for 5 leaf characteristics. Variation of the 5 leaf characters was found to be mainly in 2 dimensions and was expressed by 2 discriminant functions. The compound scores of 2 discriminant functions of the varieties could be simply plotted on 2 axes of a chart. Application of the discriminant functions is simple and consists in comparing the compound scores of an unknown sample to those of the average values of known varieties by plotting them on the chart. Individual 20-leaf samples, when plotted on the chart, were found to scatter rather widely and the points representing related varieties frequently overlapped. However, using variety Valiant as standard and adjusting the variation caused by location effect, variation was reduced to such an extent that application of discriminant functions in peach variety identification could be considered practicable. [Authors' abstract.]—Canada Dep. Agric., Summerland, B.C., and Univ. B.C., Vancouver.

2102. REGGIANI, F.
Una nuovo varietà di pesco la "Donna Mary". **(Donna Mary, a new peach.)**
Frutticoltura, 1957, **9**: 125-31, bibl. 4, illus.

An account of a cross between Admiral Dewey and Early Elberta which has recently been successfully tried in the Province of Rome. It is an early variety, yellow fleshed, of excellent flavour, having flesh easily detachable from the stone, and it will stand up to handling and transport.

Propagation and rootstocks.

(*See also* 2077, 2182c, d, p, 2264, 3003.)

2103. SCHANDER, H.
Keimungsphysiologische Studien an Kernobst. II–V. **(Studies on the germination physiology of pome fruit. II. Studies on the general temperature requirements of pome fruit seed during germination. III. Comparative varietal studies on the temperature requirements of stratified pome fruit seed and on the reversibility of the stratification processes. IV. Studies on varietal differences regarding the temperature requirements and frost resistance during germination and on ageing phenomena in pome fruit seed. V. Comparative varietal studies on the effects of hot and cold treatments acting on the seed before stratification.)**
Z. Pflanzenz., 1955/56, **34**: 421-40, bibl. 16, illus.; **35**: 89-97, bibl. 6, 179-98, bibl. 18, illus., and 345-61, bibl. 15.

Part II. A detailed description is given of the working of the controlled temperature chamber in which these studies on germination physiology were carried out.

The mechanism makes it possible either to maintain any constant temperature within a certain range or to change temperatures in a desired rhythm. The results of a close study of various temperature effects on germination processes are presented graphically, and the following rule of thumb is developed to suit the conditions at Hanover: Begin stratification at +3° C. on 15th November, change to −1° C. on 20th December; ready for sowing on 15th February. A glossary of terms used in the series of papers is appended. *Part III.* A temperature of 3–4° C. was found to be the optimum for seed germination in all the varieties studied, but the varieties differed in their response to higher temperatures. It was shown that stratified seed can be sown by machine. *Part IV.* Kirchensaller Mostbirne, by far the most common pear seedling rootstock in Germany, proved least susceptible to high or low temperatures during germination. Frost resistance at −4° C. during stratification varied greatly. The optimum temperature for the growth of root and hypocotyl immediately after germination was estimated to be 20° C. or slightly more. The optimum period of stratification was shown to be a varietal characteristic which is modified by environmental factors, especially those obtaining between harvest and germination. Germination capacity remained unaffected by storage periods up to 3 years, but after 6½ years it was reduced to practically nil. Graphs recording germination capacity and observations on the shortening of the stratification period in stored seed suggest that during the initial stages of dry storage processes similar to stratification occur in the seed. The reduction in germination capacity of ageing seed was accompanied by a rise of the optimum temperature for germination. In the case of ageing seed the tetrazolium test failed to give reliable results, except when the seed had been previously stratified. A hypothesis on the action of tetrazolium chloride upon an enzyme system in the seed is developed. *Part V.* Fruits of different apple varieties were stored at different temperatures and the seeds were germinated under optimum conditions. In this experiment pre-germination processes were found to take place in the seeds while still within the stored fruits, showing a similar susceptibility to unfavourable temperatures as do stratified seeds. Slowly germinating varieties proved more resistant to temperature effects than rapidly germinating ones. Soaked seeds were exposed to −18° C. for different periods and the varietal responses were recorded. —Inst. Obstb. Baumsch. tech. Hochsch., Hanover. [For part I see *H.A.*, 23: 1528.]

2104. Hatcher, E. S. J., and Garner, R. J.
Aspects of rootstock propagation. IV. The winter storage of hardwood cuttings.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 101-6, bibl. 3, illus.

Studies over 5 years have established the practical value of storing hardwood cuttings during the winter (Oct.–Nov. to Feb.–March) as a prelude to planting them out in nursery beds under conditions which favour root development. An electrically heated storage bin insulated on the sides with straw bales and covered on top with straw hurdles is described. A temperature of 45° F. and a peat-sand mixture have been found to provide a favourable environment for root formation. Good results have been obtained with several plum rootstocks, following quick-dip treatment with IBA at 0·5 mg. per 1 ml. 50% alcohol, and with the apple rootstocks M.VII and Crab C, following treatment with IBA at 2·5 mg./1 ml.

2105. Garner, R. J., and Hatcher, E. S. J.
Rootstock effect on the regeneration of apple cuttings.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 60-2, bibl. 6.

Hedges of Malling Crab C apple rootstock on its own roots, grafted on itself and upon rootstocks of differing vigour were used as sources of hardwood cuttings in 3 consecutive years. Cuttings from hedge plants on vigorous rootstocks established better than those from hedges on dwarfing stocks. It is suggested that parent plants may be improved as sources of cuttings by grafting upon selected rootstocks. [Authors' summary.]

2106. Jalil, M., and Sharpe, R. H.
Rooting of peach cuttings under mist as affected by media and potassium nutrition.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 324-7, bibl. 4.

Peach cuttings were taken during June to September and rooted under mist. Subterminal cuttings rooted slightly better than terminal cuttings. Two grades of Perlite, with or without peat, were tested as media, and only the coarse grade gave poor results. Supplementary lighting from 6 p.m. to 7 a.m. did not improve rooting. No effect on rooting was apparent from K fertilization of the mother stocks. As the season progressed rooting percentages decreased and K losses from the foliage increased. It is suggested that these changes are related to decreasing daylength.—Esc. agric. Panamer, Honduras, and agric. exp. Stat., Gainesville, Fla.

2107. Dikshit, N. N.
Regeneration of stem cuttings of plum (*Prunus salicina* Lindl.) as influenced by beta-indole butyric acid.
Indian J. Hort., 1956, **13**: 181-8, bibl. 11.

The effects of β-indolebutyric acid (IBA) were studied on the rooting of stem cuttings of plum (*Prunus salicina*), varieties Early Round and Howe. The untreated cuttings generally failed to produce roots, although callus, root initials, small shoots and leaves were formed. The highest percentage rooting, the most roots and the most vigorous shoots occurred on cuttings treated with the highest concentration of IBA tested (30 p.p.m.).

2108. (Brill, A. P.)
Bud-wrapping clamp.
Amer. Nurserym., 1957, **105**(3): 18, illus.

A spring-action bud-wrapping clamp has been produced, to which a rubber wrap is attached by means of spikes. The wrap is adjustable to any size of stock, can be used again and should last for at least 2 seasons.

2109. Romberg, L. D.
Use of polyethylene bags for covering bark grafts.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 71-3, illus.

Polythene bags have proved highly successful for covering grafts in tests during 2 years. [The plants used are not specified.] Two methods are described: (1) The bag can cover the graft wound and the entire scion, the end of the bag being cut after the scion has started to grow and the sides being tied below the growing bud. (2) The bag can cover the graft wound and part of the scion, the tip being allowed to protrude through a hole in the corner of the bag. The bag should be tied round the stock with string and round the scion, if it protrudes, with a rubber band. Callus formation is improved by wrapping aluminium foil round the stock and wound, either inside or outside the bag. The polythene covers provide favourable conditions for callus formation, protect the wound against borers and eliminate the need for grafting wax. —Hort. Crops Res. Branch, agric Res. Serv., U.S.D.A.

2110. Ministry of Agriculture, London.
Fruit tree raising—rootstocks and propagation.
Bull. Minist. Agric. Lond. **135**, 3rd edition 1956, pp. 50, illus., 5s.

The third edition of this bulletin [for earlier editions see *H.A.*, 16: 1801 and 19: 2734] is slightly changed in lay-out, includes some new diagrams, and is brought up to date. Two important additions are the inclusion of Malling-Merton stocks in the chapter describing rootstocks, and a new chapter on virus diseases. In the propagation section the use of hormones in striking hardwood cuttings and of double-shield budding to overcome incompatibility are described.

2111. Athenstädt, H.
Die Frosthärte unserer Obstunterlagen. **(Hardiness of fruit tree rootstocks used in Germany.)**
Dtsch. Baumsch., 1957, **9**: 46-50, bibl. 9, illus.

A really severe winter still creates havoc in German orchards. Only few stocks can so far be commended as showing a fair measure of hardiness for different fruit species: *Peaches and apricots*. A Hindukusch wild apricot under trial at the Schraderhof, Ottersleben, shows promise. *Cherries*. F 12/1 has not proved hardy enough and the only hope lies in getting a *Prunus mahaleb* which will be really compatible with sweet cherries. *Plums*. An Ackermann selection, Hüttner IV, shows promise. *Pears*. Quinces are not hardy. *Crataegus monogyna* is promising, so are Kirchensaller Mostbirne and Pillnitz *Pyrus betulifolia* clones. *Apples*. Of the Malling stocks only XI and XVI are hardy. The MM stocks are untried but highly suspect. The future possibility remains with *Malus baccata* clones raised years ago by E. Maurer at Dahlem and now being raised at Ottersleben and Pillnitz.

2112. Müller, H.
Über neue Pillnitzer Apfelunterlagen. **(New Pillnitz apple rootstocks.)** [Russian and English summaries 7 lines each.]
Arch. Gartenb., 1956, **4**: 370-8, bibl. 5.

In a trial of 5 Pillnitz-bred apple rootstocks in combination with 3 varieties yields on Pi R 80 were so satisfactory that the stock is recommended for tests by growers. It has a vigour approximating to that of EM II. Another rootstock, Pi R 900, which is medium-vigorous, is also considered promising. The data presented on tree growth and yields cover the periods 1943–55 and 1951–55 respectively.—Inst. f. Gartenb. Dresden-Pillnitz.

2113. Kas'janenko, A. I.
The productivity of apple varieties grafted on dwarfing rootstocks. [Russian.]
Agrobiologija, 1956, No. 6, pp. 83-90, illus.

Studies were conducted at Poltava in the Ukraine on 9 apple varieties grafted on common Doucin (type II), Lipetsk Doucin (type III), Ukrainian Doucin (type V), Armjansk Paradise (type VIII) and Georgian Paradise (type IX). The results, expressed in tree vigour, depth of root penetration, frost resistance and yield, showed that among dwarfing and semi-dwarfing rootstocks types III, V and VIII are most suitable for the southern steppe belt of the Ukraine.

2114. Aoki, N., and Yokoyama, H.
Studies on the double working of apples. III. Osmotic pressure in leaves of rootstocks and scions, with differences between intermediate stocks and scions in top-worked apple trees. I. [Japanese, with English summary 1 p.]
Bull. Fac. Agric. Hirosaki Univ., 1956, No. 2, pp. 10-18, bibl. 5.

The osmotic pressure and total ash content were determined in the leaves of various apple rootstocks and varieties (used as scions and intermediate stocks). There was some correlation between the osmotic pressure in the leaves of rootstocks and the vigour of the scions grown on them in the case of Japanese rootstocks but not Malling rootstocks. Among varieties it was found that leaves of Jonathan had a lower osmotic pressure than those of Starking Delicious, Golden Delicious, Indo and Ralls. In the case of trees which had developed normally after top-working the variety of the intermediate stock did not influence the osmotic pressure of the scion leaves, but in trees showing some degree of abnormality the osmotic pressure of the scion leaves was lower and the ash contents of the leaves of the scion and the intermediate stock were smaller than in those from normal top-worked trees. It is considered that varietal differences in osmotic pressure between intermediate stocks and scions may play an important role in producing disorders due to top-working. J.R.L.

2115. Higdon, R. J.
Graft-union disorders in certain blight-resistant pear root and trunk stocks.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 44-7, bibl. 2, illus.

The combinations involved were 15-year-old Comice double-worked on Oregon 18 [=French seedling P-18] trunks on Oregon 18 × Farmingdale seedling roots, and 6-year-old Forelle on P-87 French seedling trunks grafted on Oregon 18 × Farmingdale seedling roots. The disorders are illustrated but not satisfactorily explained.—Agric. Exp. Stat., Medford, Ore.

2116. Wilson, D. J.
Thirty-six-year-old trees of Conference pear on quince rootstocks.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 91-2, bibl. 3.

The tree size and crop records are given for 36-year-old trees of Conference pear on Quince A, B and C rootstocks. Cumulative yields show that the A and B stocks have outyielded C by 39 and 37% respectively. [Author's summary.]

2117. BERNSTEIN, L., BROWN, J. W., AND HAYWARD, H. E.
The influence of rootstock on growth and salt accumulation in stone-fruit trees and almonds.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 86-95, bibl. 8.

Two sorts of almond, a Golden Blush peach, a Santa Rosa plum, a French Improved prune and Royal apricot, all worked on Lovell roots, made only ⅓ as much growth on moderately saline plots [$EC_e = 5{\cdot}1$ millimhos] as on non-saline [$EC_e = 0{\cdot}9$ millimhos]. Half of this reduction was calculated to be due to chloride toxicity and half to increased osmotic pressure of the saline soil solution. The apricot was somewhat more sensitive to salinity than the others. As compared with Lovell, Shalil roots tended to produce higher chloride accumulation and less growth in the peach and the almonds. Yunnan roots increased chloride accumulations and toxicity in apricots and Marianna roots effectively reduced chloride accumulation and improved growth in the plum and prune. Effects on leaf cation content are also noted.—U.S. Salinity Lab., Riverside, Calif.

2118. PAUNOVIĆ, S. A.
Medjusobni uticaji plemke i podloge. Kajsija madjarska kalemljena na domaćoj kajsiji, dženariki i na nekim domaćim sortama šljiva. (**Rootstock-scion interrelationships. The Hungarian apricot variety worked on seedlings of domestic apricot, *Prunus myrobalana* and local varieties of plum.**) [English summary 1½ pp.]
Arh. poljopr. Nauke, 1956, **9**(24): 49-64, bibl. 12.

A 3-year study was conducted at Čačak on the growth of the Hungarian apricot budded on seedlings of domestic apricot, *P. myrobalana* and 9 plum varieties, and also on *P. myrobalana* rootstocks with 7 plum varieties as interstocks. It was found that the scion had a certain effect on the root system, but in the main the different rootstocks retained their individual characteristics. The Hungarian apricot was more vigorous on myrobalan and on the plum variety Petrovača than on domestic apricot or than unworked apricot seedlings were. On the other rootstocks it was less vigorous. In the interstock tests the myrobalan-Belošljiva-Hungarian apricot combination produced the smallest top growth but longest root system. Detailed results are discussed and set out in tables and charts.

2119. PLOCK, H.
Die Anzucht von Marillenunterlagen. (**Raising apricot rootstocks.**) [English, French and Spanish summaries 4 or 5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 23-9, illus.

A trial of possible rootstocks for apricots has been started. The stocks include selections of a local [Rhine] apricot variety, Millionär, and suckers from old apricot trees on Myrobalan and St. Julien.

2120. GARNER, R. J., AND NICOLL, C. P.
Observations on *Prunus cerasus*, *P. mahaleb* and other species as rootstocks for sweet cherries.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 63-72, bibl. 7.

Rootstocks of various species of cherry were collected, vegetatively propagated and tested for compatibility with sweet cherry scions. The behaviour of trees was observed over periods of up to 10 years in the plantation. Trees on *P. cerasus* [5 varieties] and some other species suckered from their roots, all were poorly anchored and a number died. Generally, trees on *P. mahaleb* [5 varieties] grew vigorously but failed to survive. One selected mahaleb gave small trees in the nursery. Sweet cherry (*P. avium*) varieties cropped no better on other species than on sweet rootstock controls, and it is considered that none of the rootstocks tested is suited to the production of sweet cherry trees of limited growth. [Authors' summary.] In addition to *P. cerasus* and *P. mahaleb* 11 other *Prunus* species were included in the trials, but takes were generally low and few trees survived a second year.

2121. FLOOR, J.
Report on the selection of a dwarfing rootstock for cherries. [Dutch summary 9 lines.]
Euphytica, 1957, **6**: 49-53, bibl. 10, illus.

Weak growing seedlings of the *Prunus avium* variety Limburgse boskriek were selected and tested as dwarfing rootstocks, but none proved suitable. Tests with 10 weak growing species of *Prunus*, however, led to further selection within *P. incisa* and *P. kurilensis*. Early Rivers on seedlings of these species made good growth and formed fruit buds on the one-year-old wood. Observations made on the unions during the first 2 years indicated that compatibility was good.—Inst. hort. Plant Breed., Wageningen.

2122. TYDEMAN, H. M.
A description and classification of certain plum rootstocks.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 75-80, bibl. 10, plus tables 3 and plates 24 pp.

Descriptions and illustrations are given of 23 varieties of plum rootstocks of importance or interest to the commercial grower or nurseryman, together with a classification based on certain easily recognizable characters. [Author's summary.]

Tree growth and composition.

(*See also* 2020, 2027, 2087f, o, 2182i, m, 2183h, i.)

2123. MURAWSKI, H.
Ein Beitrag zur Entwicklungsphysiologie an Apfelsämlingen. (**A report on developmental physiology of apple seedlings.**)
Züchter, 1957, **27**: 33-7, bibl. 9, illus.

Epidermal cell size, leaf size and flowering were studied in 3- and 4-year-old seedlings and in 1-year-old grafts on M.IX using buds from young and old shoots. In the primary stage and in grafts from it leaves were small with large epidermal cells, whereas later stages were characterized by large leaves and small cells. A negative correlation was found between cell size and flowering.—Dtsch. Akad. Landw., Berlin.

2124. Simons, R. K.
Comparative anatomy of leaves and shoots of Golden Delicious and Jonared apple trees grown with high and low moisture supply.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 20-6, bibl. 9, illus.

Both varieties were considerably and differently affected by moisture in epidermal and palisade cells and in size and thickness of leaf. Xylem cells were also significantly affected but variety did not seem to affect the issue. The trees were grown in a glasshouse.—Univ. Ill., Urbana.

2125. Mosse, B.
Growth and chemical composition of mycorrhizal and non-mycorrhizal apples.
Nature, 1957, **179**: 922-4, bibl. 3, illus.

Apple seedlings and apple leaf-bud cuttings were inoculated with sporocarps of an *Endogone* sp. After 3 years the mean oven-dry weight of 11 mycorrhizal clonal leaf-bud cuttings (roots, stems and leaves) was 3·8 g., that of comparable non-mycorrhizal plants being 2·9 g. In the case of seedlings the uninfected controls extended rapidly for the first 8 weeks, but were gradually overtaken by the more sturdy darker green mycorrhizal seedlings, which continued apical growth for about 6 weeks longer and were finally the bigger plants. Figures presented for the spectrographic analysis of both types of plant show that the mycorrhizal seedlings had a higher K, Fe and Cu content and a strikingly lower Mn content than the controls.—East Malling Res. Stat.

2126. Mochizuki, T., and Hanada, S.
Seasonal changes in the constituents of young apple trees. Part II. Nitrogen, phosphorus, and potassium. [Japanese, with English summary 1 p.]
Bull. Fac. Agric. Hirosaki Univ., 1956, No. 2, pp. 25-39, bibl. 24.

Studies of seasonal changes in the mineral composition of apple trees showed that: (1) When leaf development begins in May it is at the expense of reserves of N, P and K, which have been stored in the branches. (2) At the end of June the rate of shoot elongation slows down a little and the N, P, K which has been used is replaced. (3) In October the K and N contents of the branches decrease slightly. (4) Before leaf-fall the N, P and K move from the leaves to the branches. It is concluded that the growth of young apple trees may be divided into 3 periods; the first when reserves are utilized, the second when newly absorbed substances are used and the third when reserves are laid down in the enlarged tissues. The transition from the first to the second stage is marked by a small leaf on each stem, usually the eleventh or thirteenth from the base. The amount of reserves may control the growth during the first period but not the time of transition. J.R.L.

2127. Turrell, F. M., and Bentley, L. E.
Buffer capacity and pH of tissue fluids of leaves of sulphur-resistant and sulphur-shy varieties of apple (*Pyrus malus* L.) and gooseberry (*Ribes grossularia* L.)
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 114-24, bibl. 19, illus.

In leaves of apple and gooseberry varieties sulphur shyness (susceptibility) has been found to be correlated with high pH and low buffer capacity in expressed leaf-tissue fluids, which confirms Sessions' theory [*Industr. Engng Chem.* (*Industr.*), 1936, **28**: 287-90]. These correlations suggest accelerated SO_4-formation prior to protein injury. In apple leaves buffer capacity appears to play a less significant role than in gooseberry leaves. The principal buffers are malic, citric and possibly chlorogenic acids and their salts in apple leaves, and citric and malic acids and their salts in gooseberry leaves. Buffer capacity declines and pH increases in apple leaves with age. [Authors' summary.]

2128. Romaško, Ja. D.
The effect of temperature gradient on the fruiting of apple trees. [Ukrainian, with Russian summary.]
Bot. Ž., 1955, **12**(3): 68-77, from abstr. in *Ref. Ž.* (*Biol.*), 1956, No. 22, abstr. 94368.

Delayed warming up of the soil in the spring did not retard flowering, resulted in better retention of the fruit on the trees and caused some changes in the course of physiological processes; for example, peroxidase activity was increased in the root fibrils and reduced in the leaves of spurs. The author concludes that delayed warming up of the soil favours the development of the root system of apple trees.

2129. Golubinskij, I. M.
The effect of low temperatures on the germination of pollen grains of certain plants. [Ukrainian, with Russian summary.]
Bot. Ž.,1955, **12**(4): 30-40, from abstr. in *Ref. Ž.* (*Biol.*), 1956, No. 22, abstr. 94369.

Freshly collected or germinating pollen of *Primula obconica*, apple and pear was subjected to temperatures of 0 to −23° C. under dry conditions; the behaviour of pollen from anthers of frozen flowers was also studied. Germination tests under both artificial and natural conditions showed that freezing killed the germinating pollen grains but stimulated the germination of freshly collected grains.

2130. Tukey, L. D.
Some effects of night temperatures on the growth of McIntosh apples. I.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 32-43, bibl. 7, illus.

Fruiting limbs attached to the trees were enclosed during the night in heated chambers with temperatures 0, 10, 20 and 25° F. above the expected natural night temperature. Night temperatures of 81° F. were most favourable to the enlargement of the apple within 4 days after petal fall, of 72° F. from 4 to 38 days after petal fall, and of about 65° F. from 38 to 70 days after petal fall. Higher or lower temperatures resulted in reduced growth rate. The fastest growth occurred at night temperatures higher than the day temperatures for approximately 31–38 days from petal fall and lower than the day temperatures thereafter. The relationship between night and day temperatures also appeared to affect fruit size. Exposure to night temperatures of about 90° F. during a 6-week period following full bloom in 1953 had deleterious effects on bud and leaf production in 1954.—Pa St. Univ., Univ. Park.

2131. Schander, H.
Über die Ursachen von Gewichtsunterschieden bei Samen von Kernobst (Apfel und Birne). I. Die Beziehungen zwischen Samen und Frucht. II. Der Einfluss verschiedener Erb- und Umweltfaktoren auf die Beziehungen zwischen Samen und Frucht. **(On the factors governing differences in the weight of pome fruit seed (apple and pear). I. The relations between seed and fruit. II. The effect of genetical and environmental factors on the relations between seed and fruit.)**
Z. Pflanzenz., 1955, **34**: 255-306, bibl. 15, illus., and 1956, **36**: 31-80, bibl. 62, illus.

From the evaluation of his figures, which involved the use of complicated statistical methods, the author drew the following conclusions among others, on relations between seed and fruit in apples and pears: I. A statistically significant relationship was found to exist (a) between number of seeds per fruit and fruit weight, and (b) between seed weight and fruit weight. These relationships were initially established for individual trees but they proved to be generally valid for the mean values of a variety. A breaking-down of the figures showed, *inter alia*, that competition exists between the different seeds of a fruit. The significance of the findings for the study of seed germination in pome fruits is discussed. II. Deviations from the mean of seed number per fruit were affected by variety and environmental conditions. Seed number depended further on the number of locules per fruit, which in turn was influenced by the position of the flower within the influorescence. This position effect may be modified by a change in the weather during the flowering of successive flowers. Number of locules was also shown to affect the relationships between seed number and seed weight, between seed number and fruit weight and between seed weight and fruit weight. Other factors affecting seed number and the relations depending thereon were pollination conditions, on- and off-years, and the spacing of fruits. Apart from the competition between individual seeds mentioned above, the graphs also revealed a competition between seeds and fruits and between individual fruits. The seed-fruit relations differed in different parts of the tree, the higher regions favouring fruit weight unilaterally. The position of the fruit on the tree was correlated with the effect of leaf number on fruit development, which was considerable in the lower and negligible in the higher regions. Finally, our knowledge of the relations between seed and fruit is summarized and the development of both is outlined.—Inst. Obstb. Baumsch. tech. Hochsch., Hanover.

2132. Vjunov, S. F.
Characteristics of flower and vegetative bud formation in apricots. [Russian.]
Sad i Ogorod, 1957, No. 2, pp. 52-4.

In apricots usually 3 buds are found in the axil of the leaf, the central one being a vegetative bud and the 2 side ones flower buds. The vegetative buds develop first while the parent shoots are still actively growing. The side buds are initiated later, when starch begins to accumulate in the shoots, and differentiate into flower buds, indicating that carbohydrates play a decisive role in flower bud formation on fruit trees.

2133. Gerola, F. M., and Barbesino, M.
L'attività deidrogenasica del cambio in differenti periodi dell'anno in *Corylus*, *Populus* e *Prunus*. **(Dehydrogenase activity of the cambium at different seasons in *Corylus*, *Populus* and *Prunus*.)** [English summary 9 lines.]
Nuovo G. bot. ital., 1956, **63**: 37-45, bibl. 37.

Dehydrogenase activity of cambium and phloem was highest in spring and autumn. The downward gradient of activity from the shoot apex to older parts was most marked at the times of greatest activity. The trees studied were *Corylus avellana*, *Populus italica* and *Prunus avium*.

2134. Stolle, G.
Jahreszeitliche Veränderungen im Nährstoffgehalt verschiedener Organe von Schattenmorellen auf *Prunus mahaleb*. **(Seasonal changes in nutrient content of different organs of morello cherry on *Prunus mahaleb*.)**
Z. PflErnähr. Düng., 1956, **73**: 193-202, bibl. 9.

The mineral composition of 10-year-old Morello cherry trees on mahaleb was studied during a year's growth. During vegetative growth the requirement for N and K was greater than the uptake, and so the contents of these nutrients in woody tissue decreased. Contents of N, P_2O_5 and K were built up during the autumn, but a similar tendency was not observed with Ca.—Inst. Obstb. u. Obstzücht., Marquardt.

2135. Feucht, W.
Über die Beziehungen zwischen dem Sprosssystem und der Anlage von Blüten bei Pfirsich. **(The correlation between shoot system and flower formation in peach.)**
Gartenbauwiss., 1956, **3**: 265-83, bibl. 25, illus.

Shoot growth of peaches was characterized by varying periods of strong and weak growth. Growth rates were higher at increased shoot and internode lengths. Flower bud and stamen numbers were related to the growth of the part of the shoot adjacent to the flower bud, and its effect was greatest 2 days before and during node formation. Stamen number was a useful indicator of the reproductive power of the flower. Internode volume also affected the reproductive power of buds formed acropetally. In general low volume internodes increased the reproductive power, while high volume internodes reduced the number of stamens. Size of internode volume was sometimes able to compensate for the effect of growth rate, and vice versa.—Inst. Obstb. landw. Hochsch. Hohenheim.

2136. Tupicyn, D. I.
Period of dormancy and microsporogenesis in plums. [Russian.]
Bot. Žurnal, 1957, **42**: 457-61, bibl. 5, illus.

Experiments on *Prunus domestica* and 6 other species of *Prunus* have shown that under natural conditions in Uzbekistan the development of archesporial tissues proceeds during dormancy and is accompanied by the enlargement of both the anthers and the whole flower primordia. The formation of spore mother cells proceeds always after the end of dormancy. The absence of low temperature under laboratory conditions caused discontinuation of archespore development, resulting in eventual degeneration of flower promordia and fruit bud abscission.

2137. Ivanova-Parojskaja, M. I.
Structural changes in the leaf of mulberry as affected by age and conditions of growth. [Russian.]
Tr. In-ta botan. Akad. Nauk UzSSR, 1955, No. 3, 143-63, bibl. 32, illus., from abstr. in *Ref. Ž.* (*Biol.*), 1956, No. 22, abstr. 94329.

A detailed study was made of the leaf anatomy of the Central Asian white mulberry Hasak as affected by stage of maturity, dynamics of development, position on the shoot, exposure to light and density of planting. It was found that these factors induced changes not only in structure of the leaves but also in such physico-chemical properties as moisture, protein, ash and cellulose contents.

Spraying for cultural purposes.

(*See also* 2182k.)

2138. Horsfall, F., Jr., and Moore, R. C.
Isopropyl N-(3 chlorophenyl)-carbamates and other carbamates as fruit thinning sprays for Halehaven, Ambergem, and Elberta peaches.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 63-9, bibl. 5.

Considerable differences in varietal response were noticeable and are discussed. Spray thinning did not obviate the necessity for supplementary hand thinning, especially in the tops of the trees.—Va agric. Exp. Stat., Blackburg.

2139. Crane, J. C., DeKazos, E. D., and Brown, J. G.
The effect of 2,4,5-trichlorophenoxyacetic acid on growth, moisture and sugar content of apricot fruits.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 105-12, bibl. 29.

Water spraying of Derby apricot with 100 p.p.m. of 2,4,5-T shortly after the initiation of pit hardening resulted in a 33% increase in volume of fruits, which matured 4 days earlier than unsprayed fruits. The sprayed fruits had a higher moisture percentage than control fruits and a lower percentage of dry matter other than sugars. They contained higher percentages of reducing sugars and sucrose on both a fresh and dry weight basis. Temporary flagging of foliage also occurred and shoot growth was inhibited. Similar results were obtained with the Royal variety.—Univ. Calif., Davis.

2140. Maxie, E. C., and Crane, J. C.
Some metabolic effects of 2,4,5-trichlorophenoxyacetic acid on Tilton apricot fruits.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 113-23, bibl. 24.

Tilton apricot trees were sprayed at the time the pit apices were starting to harden with 100 and 75 p.p.m. 2,4,5-T. The respiration rates of the treated fruits declined more than those of unsprayed fruits and the lower respiration rates persisted during most of the growing season. There was no measurable difference in acid content or percentage of soluble solids between fruits on sprayed and unsprayed trees for several weeks after spraying, but once a change in these components had started the sprayed fruit showed a more rapid rate of change and matured somewhat earlier.—Univ. Calif., Davis.

Pruning.

(*See also* 2260, 2264, 2341j.)

2141. Müller, H.
Beitrag zur Systematik des Obstbaumschnittes. (**A contribution to the nomenclature of fruit tree pruning.**)
Arch. Gartenb., 1956, **4**: 304-11, bibl. 4, illus.

Terms relating to the pruning and training of fruit trees are defined and abbreviations for them are suggested. It is then shown how with the help of these abbreviations formulae for the training of a tree can be expressed clearly and briefly.

2142. Fisher, D. V.
Pruning tree fruits and small fruits.
[*Publ.*] *Canada Dep. Agric.*, 1957, pp. 32, illus.

Among the many aspects discussed are methods of pruning pome and stone fruit trees in the early years with emphasis on common mistakes, pruning bearing trees, dehorning old stone fruit trees, renovating old neglected trees, pruning in relation to spacing, methods of training trees on dwarfing rootstocks, and the pruning of grapes, raspberries, gooseberries and black and red currants.—Exp. Fm, Summerland, B.C.

2143. Utermark, H.
Weiterentwicklungen im Obstbaumschnitt unter Berücksichtigung der Wachstumsgesetze. (**Further developments in fruit tree pruning with regard to growth forms.**)
Mitt. ObstVersuchsringes Jork, 1957, **12**: 2-14, bibl. 3, illus.

The pruning of young and bearing apple trees is discussed in relation to plant physiology. A pyramidal crown is favoured to allow light to get into the tree centre. Observations are made on the pruning requirements of certain apple varieties.

2144. Sørensen, A.
Beskaering af unge traeer. (**Pruning young [apple] trees.**)
Erhvervsfrugtavl., 1957, **23**: 86-8, illus.

From a number of pruning trials with young apple trees of several varieties, laid down in growers' plantations, the first results of two trials are now available. The trees were planted in 1951 and data are tabulated on yields in 1955 and 1956, on the percentage of bitter pit developed in storage and on the time taken to prune the trees, 4 methods being compared. Incidence of bitter pit was found to rise from 5·1% in lightly pruned trees (about 2 minutes) to 30·8% in spur-pruned trees (about 10 min.). With regard to yields light pruning also gave the most favourable results.

2145. Johansson, E., and Klang, C. A.
Beskärningsförsök med äpple vid Skepparp, Haväng, 1944–1955. (**A pruning trial with apples at Skepparp, Haväng [Sweden], 1944-55.**) [English and Esperanto summaries 14 lines each.]
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 23-30, bibl. 3, illus.

"K-pruning", a method developed by a grower at Kivik which produces trees similar to those pruned by the delayed open-centre method, was compared with a somewhat modified method of normal pruning which gives modified-leader trees. Although 4 out of the 7 apple varieties used in the trials yielded a little more with K-pruning, the difference between the two systems was not significant.

Nutrition and soil management.

(*See also* 2054, 2061, 2126, 2134, 2182s, z, 2183a, i, 2275, 3011.)

2146. Ministry of Agriculture, London.
Soils and manures for fruit.
Bull. Minist. Agric. Lond. **107**, 2nd edition 1956, pp. 41, illus., 3s. 6d.

In the twenty years since the publication of the first edition of this bulletin [see *H.A.*, 7: 796] much scientific and practical information on fruit growing has accumulated, so that the bulletin has had to be entirely rewritten. A new section has been included on soils for fruit, which is based on information from pre-war soil surveys in some important fruit growing areas. In the section on mineral requirements for fruit, brief descriptions of nutrient deficiencies and excesses are given with photographs. The modification of nutritional requirements by orchard practice is discussed, and finally recommendations for manuring individual top and soft fruits are given.

2147. Statens Forsgøsvirksomhed i Plantekultur.
Forsøg med kalium-, fosforsyre- og kvaelstofgødskning til aebletraeer 1928-52. (**Experiments on potassium, phosphoric acid and nitrogen manuring of apple trees, 1928-52.**)
Tidsskr. Planteavl, 1957, **61**: 162-6.

In the heavy loam soil of Blangstedgaard the trees required higher potassium applications than in the light, sandy soil of Hornum. Superphosphate had no effect, and nitrogen affected only leaf and fruit colour but neither tree growth nor yields.

2148. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med sammenligning af staldgødning og kunstgødning til aebletraeer 1928-52. (**Experiments comparing stable manure and artificial fertilizers for apple trees, 1928-52.**)
Tidsskr. Planteavl, 1957, **61**: 167-70.

Stable manure and equivalent amounts of artificials had practically identical effects on yield and fruit size of several apple varieties.—Blangstedgaard and Hornum.

2149. Dullum, N., and Dalbro, S.
Gødningsforsøg med aebletraeer. (**Manurial trials with apple trees.**) [English summary 2 pp.]
Tidsskr. Planteavl, 1956, **60**: 369-485, bibl. 11, illus.

Six manurial experiments were carried out between 1928 and 1952 on 2 soil types with trees of Mère de Ménage, Bramley's Seedling, Filippa, Lane's Prince Albert and Cox's Pomona on M.IV. On a clay soil applications of 100 and 200 kg. K_2O per hectare improved tree size, yield and fruit size; fruit storage life was not affected by potash treatments. On a sandy loam yields were increased at the 100 kg. level of K_2O, but higher levels gave no further improvement. No significant effects were induced by superphosphate applications. Nitrogen did not affect tree size, yield or fruit size, but leaves were lighter green when N was omitted. In comparative trials with farmyard manure and inorganic fertilizers, tree size, yield and fruit size increased with increasing applications on the clay soil, but no differences were shown between the effects of manure and fertilizers. On the sandy loam there was a marked increase in tree size, yield and fruit size with applications of 10 tons of farmyard manure and its equivalent in inorganic fertilizer, but higher applications did not enhance the effect. Liming did not affect tree performance but it increased the tendency to Mn deficiency on the clay soil. On the clay soil 2 applications of pulverized S produced very high yields throughout the experiments. It is suggested that S releases potassium ions in the top soil, which are then leached down to the principal root zone. It was confirmed that biennial bearing became more marked after higher rates of manuring.

2150. Rootsi, N., and Fernqvist, I.
Fortsatta undersökningar över gödslingens inverkan på askorbinsyrehalten hos Cox's Orange. (**Continued studies on the effect of manuring on the ascorbic acid content of Cox's Orange.**) [German summary 1¼ p.]
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 51-9, bibl. 3.

In the 1956 trials the following results were obtained: (1) K again, except where soil potassium was high, reduced ascorbic acid content. (2) The effect of P varied and that of N was uncertain. (3) The ascorbic acid content was lowest after applications of stable manure+NPK. (4) As in 1955, fruit size was negatively related to ascorbic acid content. (5) Fruits with 25% red skin colour had a considerably higher ascorbic acid content than green fruits. (6) The soluble dry matter (refractometer value) content of the fruits was lower in K than in no-K plots. This suggests that the lower content of soluble dry matter is one of the causes of a reduction in ascorbic acid content after K manuring. Finally, it is suggested that in a study of fertilizer effects the comparison should be made between fruits of the same weight and colour. [For an abstract of earlier work see *H.A.*, 16: 2458.]

2151. Weeks, W. D., and Southwick, F. W.
The relation of nitrogen fertilization to annual production of McIntosh apples.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 27-31, bibl. 9.

In these 6-year trials trees at high nitrogen levels were no better at maintaining annual production than trees at low nitrogen level. Crop size seemed to be the determining factor.—Univ. Mass., Amherst.

2152. Reinken, G.
Untersuchungen über die Aufnahme verschiedener Phosphatverbindungen und die Phosphorverteilung bei Apfelbäumen. **(Investigations on the absorption of different phosphate compounds and the distribution of phosphorus in apple trees.)**
Gartenbauwiss., 1956, **3**: 3-58, bibl. 183, illus.

Two years' pot experiments in the open with Zuccalmaglio apple trees, 8–9 to a plot, on EM XI rootstocks were devoted to a study of the root assimilative capacity for different phosphate compounds. The medium was a mixture of sand and peat having a pH value of 6·5 and a very low P content. The girtho f the trees was found to be very deleteriously affected by treatment with apatite and tricalcium phosphate, and rather less so when iron and aluminium phosphates were used, but not at all following the use of monocalcium and dicalcium phosphate. Dimagnesium phosphate had the best effect. The plots treated with apatite, tricalcium phosphate or no phosphate all showed P deficiency symptoms, which indicates that apple trees have little capacity for absorbing insoluble P compounds. A decrease in P absorption resulted in growth starting late and ending early, in decreased size, weight and water content of leaves and in structural malformation. Length and cross growth of stems and shoots was checked and root growth was damaged more than top growth. The number of blossoms on the young trees was not affected, but set and size of fruit was less in the absence of P and the resulting highly coloured fruits did not keep so well. Leaf analysis throughout showed a positive correlation between P_2O_5 content and growth. There was a partial correlation between P content of leaves and Ca, Mg, Fe, Mn and N contents. The amount of P assimilated affected the amount of leaf pigments, high P content being correlated with high chlorophyll and low xanthophyll contents; carotin content was unaffected. The phosphatase activity in the leaves could be regarded as a measure of the phosphate absorption by the tree. Soil analyses also showed that very little of the insoluble P compounds had been absorbed. Trials for several months with labelled P^{32} on James Grieve worked on EM IX in a sand peat mixture and with Zuccalmaglio on EM XI in a normal loam soil showed that the results hold good for trees on EM IX under natural conditions. Here, too, dimagnesium phosphate was most easily absorbed, monocalcium phosphate next best and apatite hardly at all. As regards distribution of P in the tree the movement of P^{32} was very quick, which indicates that phosphates do not travel only in the transpiration stream. The distribution of P^{32} in the different tissues followed definite rules. Thus branches arising lower in the crown showed higher activity than higher branches. Again at the beginning of the spring growth and of the later autumn growth increased amounts of P^{32} were found in developing leaves and shoots. P was found in larger amounts in the flowers than in the young fruits. Blocks were found below the union, especially where compatibility was poor. P^{32} applied to shoots passed to the roots and finally out into the soil. Losses of P due to washing off the leaves were negligible. These trials indicate that an explanation for the lack of effect of P manuring in many trials should be sought not in a pronounced capacity of apple roots to absorb insoluble P compounds, but in the economic use of P in the plant and in its comparatively restricted use, as compared with that of N, K, Ca, for the manufacture of wood, leaf and fruit. [From author's summary.]—Inst. Obstb. Univ. Bonn.

2153. Roach, W. A., and others.
A method of growing apple trees by spraying their roots with nutrient solutions.
J. hort. Sci., 1957, **32**: 85-98, bibl. 7, illus.

The method, which is described in detail with the aid of diagrams, was designed to grow small apple trees under controlled conditions of mineral nutrition. The equipment consists of water purification and nutrient solution mixing tanks, a dispensing unit and culture units. In the last of these the trees are grown in the open with their roots suspended in air below a watertight, dust-proof lid and supplied with a continuous spray of nutrient solution. In tests trees grown in this way made shoot growth that was almost as good as that of comparable trees grown in soil under conditions approaching the optimum. Their roots were long and fleshy in contrast to the usual fibre development in soil, and root hairs were long and numerous. The roots were free from the bacterial and fungal slimes that usually develop when apple trees are grown in water culture. Mycorrhiza could not be found. In a trial involving 4 nutrient treatments, namely, complete nutrient, low K, low Fe and low Mn, spectrographic analysis of individual leaves revealed striking differences in the contents of these elements according to position on the shoot, time of year and treatment.—E. Malling Res. Stat.

2154. Proebsting, E. L.
Tree nutrient sprays.
Calif. Agric., 1957, **11**(3): 10.

Experience gained at Davis and in commercial orchards on the spray application of major and minor elements to deciduous fruit trees is reviewed briefly. Foliar applications of urea have established themselves as a useful supplement to soil applications of N in the case of apples, although some varieties do not absorb urea as readily as others. Pears have proved somewhat less responsive and stone fruits have generally absorbed only a little urea and shown negligible response. Figs have been shown to absorb urea readily. Several species will absorb phosphates, but no responses have so far been recorded. The use of potassium as a nutrient spray has not been successful.

2155. Östlind, N.
Gödslingsförsök med plommon vid Kurrebo 1944-1954. **(A manurial trial with plums at Kurrebo, 1944-1954.)** [English summary 20 lines.]
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 77-87, bibl. 6, illus.

Data are presented on the growth and yield responses of two plum varieties—Oullins and another which had to be discarded—on two rootstocks to applications of NPK, NP and NK. The trees were planted in 1944 at Kurrebo, county of Kronoberg, Sweden, and the amounts of fertilizer applied per ha were 500 kg. ammonium sulphate (20·8% N), 300 kg. potassium salt (40% K_2O) and 200 kg. superphosphate (20% P_2O_5). In 1944 the P content of the soil was very low but the K level was high. Yields were found to respond to P manuring, while the effect of K was not significant. Analyses in 1954 showed that the bulk of the nutrients remained in the top 25 cm. of the soil where the roots disturbed by cultivation could not absorb them. The desirability is discussed of applying fertilizers to a deeper layer in the soil.

2156. Ritter, C. M.
Effects of varying rates of nitrogen fertilization on young Elberta peach trees.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 48-55, bibl. 21.

This is a 3-year progress report on a long term experiment with Elberta peach on Lovell rootstocks planted in 1952, and it largely covers the pre-bearing period. Four levels of N were applied annually from 1952 as ammonium nitrate and results are discussed in some detail. Possibly the most striking feature noted so far is that all levels of N appear to have increased in some way the effectiveness of the trees in absorbing and utilizing the available K and Mn as compared with the check trees. The mere application of N more than doubled yield in the first year of fruiting. Favourable foliage effects were also noticeable.—Pa St. Univ., Univ. Park. [See also *H.A.*, 26: 3378.]

2157. Havis, L.
Effects of times of applying nitrogen and of disking on bearing Elberta, Halehaven and Triogem peach trees.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 70-76, bibl. 8.

The trees were planted in 1943 and were uniformly treated till the autumn of 1947 when the differential timing of N application started. The different times of disking were applied as from the spring of 1948. Results are reported on full crops for all varieties in 1950, 1951 and 1952. Crops were lower and earlier when N was applied in the autumn than when it was given in the spring or when it was equally divided between autumn, spring and early summer. They were usually higher following the last treatment. Time of disking had little effect on yield. Differences in fruit size resulting from the different treatments were inconsistent. Disking did not affect time of ripening. —U.S. Dep. Agric., Beltsville, Md.

2158. Veihmeyer, F. J., and Hendrickson, A. H.
Grapes and deciduous fruits.
Calif. Agric., 1957, **11**(4): 13-14, 18, illus.

The general principles of irrigation in California are discussed. Experiments with canning peaches have shown that the maintenance of readily available moisture up to and including harvest time did not affect shipping or canning quality but did improve texture. Quality in prunes, measured by specific gravity, was not greatly affected by irrigation treatment. Irrigation did not affect quality, flavour or drying ratio of table and raisin varieties of grapes.

2159. Goetz, J.
Untersuchungen zur Frage der Auswirkungen des Grasmulches auf den N/P/K-Haushalt und die pflanzensoziologischen Verhältnisse. (**Studies on the effect of grass mulches on the N/P/K status and plant sociological conditions.**)
Reprinted from *Z. Acker- u. PflBau*, 1956, **102**: 311-38, bibl. 90.

Studies concerned with orchard management were started to compare moisture and nutrient status in grass mulch, meadow and clean cultivated plots. In the mulch plots the grass was cut every 3 weeks, and the meadow twice during the year. In all plots ammonium N was lower at the end of the second year than before the preliminary manuring. Nitrate N increased in the clean cultivated plots, but there was little or no change in the meadow or grass mulch plots. The content of lactate-soluble phosphoric acid increased in the topsoil of all plots. The content of lactate-soluble K increased in the grass mulch plots with a low level of rainfall and in clean cultivated plots at both high and low levels of rainfall. No effect of grass mulch on pH could be determined. Grass mulch plots had higher moisture contents to a depth of 30 cm. than meadow plots before the first cut, and before the second cut differences were even greater. Grass mulch plots had higher moisture contents in the top 10 cm. layer than clean cultivated plots. Five of the grass species tested increased their total dry weights considerably under the grass mulch treatment. There was a marked reduction in rooting in the grass mulch plots in the 20–30 cm. layer.—Inst. Obstb., Univ. Bonn.

2160. Latimer, L. P.
Good mulch ups yield.
Amer. Fruit Gr, 1957, **77**(3): 62, illus.

In New Hampshire a sod mulch system has been successful in the production of apples on stony hillside areas. Mulching experiments over a 12-year period have shown that McIntosh trees mulched with hay produced 50% more fruit than trees grown in grass without additional mulch or with pine sawdust. Root growth was improved by the hay mulch but it also seemed to limit the lateral spread of feeding roots. Results with pine sawdust as a mulch were poor.

2161. Rasmussen, P.
Vandbalance, meteorologiske og jordbundsfysiske målinger i frugtplantage ved forskellige kulturmetoder. (**Water relations, microclimate and soil moisture in an orchard under different methods of soil management.**)
[English summary 1¾ pp.]
Tidsskr. Planteavl, 1957, **61**: 49-102, bibl. 41, illus.

In an orchard of Cox's Orange trees planted in 1949 numerous microclimatic and soil moisture measurements were carried out in 1953 and 1954 under three methods of soil management, viz. straw mulch, short grass and clean cultivation. From the multitude of data presented in graphs and tables the following among other conclusions were drawn: (1) Grass is wasteful of soil moisture whereas straw is water con-serving, the values for water depletion in the soil at a depth of 25 cm. in the middle of the summer being 80–90% under grass, 50–60% under clean cultivation and about 30% under straw. (2) At a height of 10 cm. above the ground the minimum temperatures in May and June were about 5° C. lower over straw than over grass or clean cultivation, night frosts occurring even in June over straw. Over straw the difference in night and morning (9 a.m.) temperatures at times exceeded 28° C. At a height of 50 cm. above the ground the differences between methods of soil management were less pronounced. (3) The temperature of the top soil under straw was 2–6° C. lower in summer and 2–3° C. higher in winter than under the two other treatments.—For general guidance the following recommendations are made: "Covering by straw will be suitable in areas with light soil in which the maximum quantity of available water is small and the precipitation insufficient and which, according to experience, are not exposed to late night-frosts. In areas with good soil, a great quantity of available water and abundant precipitation, grass may be used if it is kept short. Frequent cutting reduces the water consumption and the root activity of the grass. Clean cultivation in conjunction with an annual cover crop, sown about mid-summer, can, according to experiments and experience, be used in most places. This method of cultivation does not dry up the soil as much as grass sod and the low temperatures are avoided." The experiments were carried out at Blangstedgaard Research Station in co-operation with other institutes.

2162. Stevenson, I. L., and Chase, F. E.
Microbiological studies on an orchard soil under three cultural practices.
Canad. J. Microbiol., 1957, **3**: 351-8, bibl. 20.

The beneficial effects of a mulch in a peach orchard at the Ontario Horticultural Experimental Station, Vineland, have been described in an earlier paper [*H.A.*, 24: 3511]. Since the response to mulching was greater than could be attributed to the mulch as a source of inorganic nutrients, a study was made of the soil microbial processes in the orchard. The results showed that maximum respiratory activity occurred in the mulched soil, followed in descending order by sod and by clean cultivation plus buckwheat cover crop methods of management. Although differences in cellulose decomposition were less marked, there was evidence to suggest that mulching maintained cellulose-decomposing organisms at the highest level. The treatments only produced minor differences in the numbers of bacteria, fungi, and actinomycetes, but the mulch reduced seasonal fluctuations, especially during the summer.

2163. Wilkinson, B. G.
The effect of orchard factors on the chemical composition of apples. I. Some effects of manurial treatment and of grass.
J. hort. Sci., 1957, **32**: 74-84, bibl. 12.

Cox's Orange Pippin apples from an NPK manurial trial have been analysed and the results for 2 seasons have been given. Potash application increased the K content of the apples by an average of 12% in 1954 and 15% in 1955, but application of superphosphate had no effect on any of the constituents measured. Grass cover increased P concentration in the apple by about 30% and also increased Na in all treatments. Where N had not been applied, grass cover also substantially increased K and Mg contents and titratable acidity. In the sunnier 1955 season, titratable acidity and K and Mg concentrations were all higher, but the larger apples of an abnormally small crop had an average of only 4·6 mg. of Ca per 100 g. fresh weight as against 7·2 mg. in the previous season. The figures given, and those for commercial samples, indicate that, between orchards and between manurial treatments, there may be a range of at least two-fold in the concentrations of some of the major elements; K has varied from 88 to 193 mg. per 100 g. fresh weight, Mg from 3·1 to 6·9, Ca from 4·1 to 9·5 and P from 11·4 to 19·9. [Author's summary.]—Ditton Lab., D.S.I.R.

2164. Bollard, E. G.
Effect of a permanent grass cover on apple-tree yield in the first years after grassing.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 527-32, bibl. 3, illus.

An experiment has been initiated in the Nelson district to assess effects of a grass and clover sward on apple-tree growth and production. In the first six years a reduction in yield occurred in trees under grass. Addition of extra nitrogenous fertilizer increased the yield of trees under both grass and clean cultivation. The yield of trees under grass and with this extra nitrogen was not as high as trees under clean cultivation and without extra nitrogen. Omission of phosphate did not reduce yield under either grass or clean cultivation. [Author's summary.]—Fruit Res. Stat., D.S.I.R., Auckland.

2165. Wierszyłłowski, J., and Galińska, H.
Wpływ roślin okrywowych na przemarzanie i dalszy wzrost drzewek w szkółce. **(The effect of cover crops on the frost resistance and growth of nursery trees.)** [English and Russian summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1956, **74**: 65-77, bibl. 5.

In 1952 and 1953 the following cover crops were sown in a fruit tree nursery at Przybroda between rows of apples and pears: broad beans at 200 kg./ha, mixed legumes with barley at 300 kg./ha, white mustard at 27 kg./ha and *Phacelia tanacetifolia* at 33 kg./ha. During the severe winter of 1953/54 45% of the trees were damaged by frost in the cover crop plots as against 85% damaged in clean cultivated plots. The cover crops did not retard the growth of the trees, and both types of legumes proved to be beneficial, giving the largest annual growth increment. In addition the work entailed in cover crop culture was only 10–14% of that required for clean cultivation.

Fruit composition.

(*See also* 2023, 2139, 2140, 2150, 2163, 2240b.)

2166. Doesburg, J. J.
Relation between the solubilization of pectin and the fate of organic acids during maturation of apples.
J. Sci. Food Agric., 1957, **8**: 206-16, bibl. 35.

The amount, degree of esterification and molecular weight of pectins in apples were investigated weekly during some months before and after harvest. Since molecular weight of pectin has been found constant during that period and the molecular weights of insoluble and soluble pectins in ripe fruits are nearly equal, there seems to be no shortening of chains of pectin molecules during the solubilization of a part of the pectins during ripening. The correlation between changes in solubility of pectin and in solubility of calcium, changes in the composition of the mixture of organic acids in the fruits, and some experimental evidence of a change of the pH of cell walls during that period, may be an indication that solubilization of pectin during ripening of fruits is caused by movement of calcium in the cell walls. Experiments on the relation between behaviour of calcium and solubility and swelling of pectin in cell walls and in artificial pectin films are discussed.—Inst. Res. Storage hort. Prod., Wageningen.

2167. Hulme, A. C., and Wooltorton, L. S. C.
The organic acid metabolism of apple fruits: changes in individual acids during growth on the tree.
J. Sci. Food Agric., 1957, **8**: 117-22, bibl. 18.

A study was made by ion-exchange and chromatography on silica gel of the organic acids present in apple pulp and peel at various stages of maturity. The concentration of quinic acid falls rapidly throughout the developmental period, whilst that of malic acid reaches a peak 50–60 days after petal fall. Citric acid, present in much smaller proportion than the other two acids, shows considerable changes in amount and concentration. [From authors' summary.]—D.S.I.R., Ditton Lab., Larkfield, Kent.

2168. Matzner, F.
Über mikrobielle Hemmstoffe in Äpfeln. **(On microbial inhibitors in apples.)**
Arch. Gartenb., 1956, **4**: 296-303, bibl. 9, illus.

Tests showed that apples contain bacterial inhibitors, the action of which varies with the variety. These antibiotics decrease during ripening and during storage according to conditions. Further experiments will be carried out to examine whether the inhibitors are among the factors determining quality in fruit.—Friedrich-Schiller-Univ. Jena.

2169. Matzner, F.
Der Bitterstoffgehalt der Aprikosenkerne als Sortenmerkmal und als natürlicher Schutz gegen Eichhörnchenschäden. **(The content of bitter substances in apricot stones as a varietal characteristic and as a natural protection against damage by squirrels.)**
Arch. Gartenb., 1956, **4**: 211-17, bibl. 9, illus.

In apricot orchards near Jena, Germany, squirrels do a great deal of damage, but it was observed that they spare trees the fruits of which have bitter stones. The taste of stones of the more important varieties is noted. Rootstocks were found to have no influence on bitterness or sweetness in stones. It is suggested that the taste of stones should be utilized in the identification of apricot varieties.—Inst. Acker- u. Pflanzenb. Friedrich-Schiller-Univ., Jena.

Packing and storage.

(*See also* 2086, 2182o, y, 2282, 2283, 2291, 2334.)

2170. Hicks, E. W.
Precooling of fruit and vegetables. Some theoretical considerations, being Paper presented at the 9th International Congress on Refrigeration, Paris, 1955, pp. 8, bibl. 6.

The author considers (a) the case in which the flow of the cooling medium over the individual fruits is so good that each may be treated as freely exposed to it, and (b) the case in which there is no airflow into the packages and the transfer of heat within them is purely by conduction.

2171. Pflug, I. J., Brandt, M. W., and Dewey, D. H.
An experimental tilt-up concrete building for the controlled-atmosphere storage of apples.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 505-10, illus.

Plans and constructional details are given of an inexpensive, experimental controlled-atmosphere store with an 800-bushel capacity. In an initial trial 823 bushels of apples refrigerated at 32° F. developed the desired atmosphere of 3% O_2 in 29 days. It has been noticed, however, that high winds may cause a rise in the O_2 level of 0·2–0·3%, and further tests will be necessary before the store can be recommended for general use.

2172. Hunter, D. L., and Meyer, C. H.
The effect of apple handling methods on storage space utilization.
Market. Res. Rep. U.S. Dep. Agric. **130**, 1956, pp. 18, illus., Supt. Doc. Wash. 25 D.C., 15 cents.

This is the 4th of 5 reports submitted by the Washington State Apple Commission in fulfilment of its contract with the U.S. Department of Agriculture. They all concern or will concern the economics of apple handling and storage on a large scale. The first 3 were No. 49, Apple handling methods and equipment in Pacific Northwest apple packing and storage houses; No. 68, Innovations in apple handling methods and equipment; and No. 71, Handling empty apple boxes in Pacific Northwest apple packing and storage houses [see *H.A.*, 25: 2502]. The fifth will cover plantwide materials–handling costs. After the issue of the 5th a summary is planned. These eminently practical bulletins should be in the hands of anyone proposing to embark on packing house construction on a large scale. Report No. 55 published by the Agricultural Research Service of the Department in 1954 on "Methods and costs of loading apples in the orchard in the Pacific Northwest" [see *H.A.*, 25: 201] summarizes another phase of the subject.

2173. Hulme, A. C., and Neal, G. E.
A new factor in the respiration climacteric of apple fruits.
Nature, 1957, **179**: 1192-3, bibl. 1.

The authors had found earlier that tissue slices from Bramley's Seedling apples are capable of a vigorous decarboxylation of added malate. This capacity develops at the time of the climacteric rise in respiration of the whole fruit. In order to study the effect of added malate on the production of CO_2 of whole fruits 0·67% and 1·34% malate were injected at intervals from July to early September into a branch of a Bramley's Seedling tree. Fruit from treated branches, picked in September, showed a higher and earlier climacteric rise than the controls.—Ditton Lab., Food Invest. Organ., D.S.I.R.

2174. ULRICH, R., AND MIMAULT, J.
Transformation des composés pectiques et respiration des poires en cours de maturation. **(Transformation of pectic compounds and respiration of pears during ripening.)**
Fruits d'Outre Mer, 1956, **11**: 467-70, bibl. 9.

Pears previously stored at 0° C. were kept at 18° C. in continuously renewed atmospheres. In nitrogen their CO_2 output was reduced to less than 70% of that in air and production of soluble pectins was approximately zero. In 60% carbon monoxide and 40% air their production of both CO_2 and soluble pectins was reduced to between 70% and 80% of normal. In air containing 0·3% of ethylene respiration was increased, but the final pectin balance was below that in ordinary air, probably because the peak had been passed and degradation of pectins had begun.

2175. MARIS MCARTHUR-HESPE, G. W. F.
The activity of starch-hydrolysing enzymes in pears during development and cold-storage.
Acta bot. neerl., 1956, **5**: 200-13, bibl. 12.

Changes in enzyme activity during growth and cold storage of Doyenné Boussoch, Comtesse de Paris and Conference pears were studied. The quantities of α- and β-amylase increased to a certain extent during development on the tree. During cold storage the quantity of α-amylase continued to increase, reaching a value above that reached under natural conditions. Varietal differences in α-amylase increases were observed. There was a relationship between the rise in α-amylase activity and the possibility of ripening after cold storage; with an excessive increase in α-amylase content, fruits did not ripen after cold storage. —Univ. Amsterdam.

2176. ULRICH, R., AND PAULIN, A.
Sur la physiologie de la maturation des poires Passe Crassane, à diverses températures. **(The physiology of ripening in Passe Crassane pears at various temperatures.)**
C.R. Acad. Agric. Fr., 1957, **43**: 78-81, bibl. 7.

Respiratory activity of pears harvested in the Paris region has been studied. The maximum climacteric was apparent each time that ripening was possible. The longer the cold treatment prior to ripening, the sooner was the climacteric reached at the ripening temperature of 18° C. The climacteric was preceded by a less marked peak in respiration. Ripening was most even in pears stored at 0° C. for 15 weeks before being ripened at 18° C. Pears from La Réole [Loire] did not appear to need a period of cold storage before ripening at 18° C. Ethylene for 2 weeks during cold storage did not hasten ripening at 18° C. Pears from La Réole had a relatively high sugar content, while the Parisian pears showed only a slow increase in sugars during cold storage.—Stat. Froid Bellevue, C.N.R.S.

2177. HARTMANN, C.
Quelques aspects du métabolisme des cerises et des abricots au cours de la maturation et de la sénescence. **(Some aspects of the metabolism of cherries and apricots during ripening and senescence.)**
Fruits d'Outre Mer, 1957, **12**: 45-9, bibl. 11.

Changes in respiratory activity and contents of alcohol, acetaldehyde and soluble pectin are shown in graphs, most of the data referring to fruit held at 15° C. with additional respiration curves for 4° C.

2178. AGRICULTURAL MARKETING SERVICE, U.S.D.A.
New shipping containers for plums.
Market. Res. Rep. U.S. Dep. Agric. **128**, 1956, pp. 44, illus., Supt. Doc. U.S. Printing Office, Washington 25 D.C., 20 cents.

During research on plum loading some 30 experimental containers received from a dozen co-operating manufacturers were screened. Four performed satisfactorily, and two of these were used commercially in 1955. The inside dimensions of each one of these 4 types was 12½ in. square by 7 in. deep, and each was designed to take 25 lb. plums; they were of fibre board. Full illustrated details are given here of each type and the advantages from the standpoint of price, packing and loading costs are discussed.

2179. PAUNOVIĆ, S. A., AND GRKOVIĆ, L.
Prilog proučavanju trajašnosti svežih plodova šljive požegače. **(Studies on the keeping quality of the plum variety Požegača.)** [English summary 1 p.]
Arh. poljopr. Nauke, 1956, **9**(24): 81-9, bibl. 7.

Požegača plums were picked at 3 stages of maturity and stored for 12 and 28 days at a room temperature of 19·4° C. and 1° C. Storage at room temperature was unsatisfactory regardless of the degree of ripeness. For storage at 1° C. medium ripe fruit was found to be the most suitable, for, while losses due to shrinking and decay at the end of 28 days' storage were greater than in green and fully ripe fruit, quality was superior. The medium ripe fruit had the highest soluble matter and sugar contents at time of harvest, and these increased during storage by 3·0% and 1·79%, finally amounting to 27·2 and 16·7% respectively.

Processing.

(*See also* 2088r, 2182e, 3009.)

2180. LEONARD, S., AND OTHERS.
Bartlett pears for canning.
Calif. Agric., 1957, **11**(2): 10, 15.

Fresh Bartlett pears with a firmness of 20 lb., as measured by a Ballauf fruit pressure tester ($\frac{5}{16}$ in. plunger), were stored for 10 days at 34° F. and then ripened at 70° F. for various periods. Chemical changes that occurred during ripening are summarized. When the pressure test reading fell below 4·9 lb., rapid softening and colour change occurred and aroma and flavour improved. During this phase and until the pressure-test reading dropped to 1·5 lb. the content of volatile reducing substances increased.

2181. OLIVIER, O. J.
Dehydrate prunes and prevent spoilage.
Fmg S. Afr., 1957, **32**(12): 22-6, illus.

Tests have shown that internal fermentation and fungal spoilage were much less in dehydrated prunes than in sun-dried prunes. Quality deteriorated if the prunes were left lying in the orchard before gathering. Fungal control was satisfactory after captan treatment, but authority for its use has not yet been obtained.

Noted.

2182.

a ANON.
A comparison of fruit consumption trends in the United Kingdom and other countries.
Mon. Bull. agric. Econ. FAO, 1957, **6**(2): 1-4, bibl. 4.

b BOHL, C.
Cómo reemplazar plantaciones frutales antiguas por nuevas. **(How to replace old orchards by new.)**
Inf. SCIPA, 1956, No. 28, pp. 27-8.
Advice on replanting quince, apple, pear, peach, cherry, damson and almond orchards in Peru.

c BRASE, K. D.
Propagating fruit trees.
Bull. N.Y. St. agric. Exp. Stat. **773**, 1956, pp. 41, illus.
Considerable detail of modern methods for deciduous tree fruits.

d BUSCH, W.
Betriebswirtschaftliche Probleme im Baumschulwesen. **(Problems of nursery management.)**
Dtsch. Baumsch., 1956, **8**: 257-66, 293-8, bibl. 6.
A discussion of economics in fruit tree and ornamental nurseries.

e CLAYPOOL, L. L., AND KILBUCK, J.
The influence of maturity of interior valley French prunes on the yield and quality of the dried product.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 77-85, bibl. 11.
A fuller account of work abstracted in *H.A.* 26: 223.

f CRANE, J. C., AND PUNSRI, P.
Comparative growth of the endosperm and the embryo in unsprayed and 2,4,5-trichlorophenoxyacetic acid sprayed Royal and Tilton apricots.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 96-104, bibl. 17.
Effects differed in the two varieties.

g DERMEN, H.
A 2-4-2 chimera of McIntosh apple.
J. Wash. Acad. Sci., 1955, **45**: 324-7, bibl. 7, illus.
Kimball Giant McIntosh.

h GLENN, E. M.
Blossoming periods of some tree fruits at East Malling.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 89-90, bibl. 1.
Means for 7–10 years for 11 apple, 2 pear and 8 plum varieties.

i HASEGAWA, M.
Flavonoids of various *Prunus* species. VI. The flavonoids in the wood of *Prunus aequinoctialis, P. nipponica, P. maximowiczii* and *P. avium.*
J. Amer. chem. Soc., 1957, **79**: 1738-40, bibl. 9.

j HILKENBÄUMER, F., AND HEIBER, H.
Arbeits- und Materialkosten im Obstbau. **(Costs of labour and materials in fruit growing.)**
Dtsch. GartenbWirtsch., 1957, **5**: 1-3.
Data compared for apples, cherries and plums.

k HOFFMAN, M. B.
Chemical thinning of apples and peaches.
St. hort. Ass. Pa News, 1957, **36**: 17-21.
A general discussion with examples of recent results.

l HORN, A. S.
The fruit areas of America. Idaho.
Amer. Fruit Gr, 1957, **77**(3): 16-17, illus.
Top fruit varieties grown are mentioned.

m HUBER, B., AND VON JAZEWITSCH, W.
Zur Entwicklungsphysiologie der *Prunus*-Rinde. **(The physiology of the development of *Prunus* bark.)**
Acta bot. neerl., 1955, **4**: 385-8, bibl. 9, illus.

n JOHANSEN, C.
Artificial pollination of apples with bee-collected pollen.
J. econ. Ent., 1956, **49**: 825-8, bibl. 11, illus.
See *H.A.*, 26: 2471.

o (KÜHNE, V.)
L'économie fruitière en Italie. Culture et utilisation des fruits à pépins et à noyau. **(Fruit economics in Italy. Cultivation and utilization of pome and stone fruits.)**
Rapport de la Commission suisse d'Étude de l'Économie fruitière étrangère, 1956, pp. 140, bibl. 21, illus.
Growing, packing and marketing of apples, pears, apricots, cherries, peaches and plums.

p LAPINS, K.
Identification of nursery stock.
Publ. Canada Dep. Agric. **922**, 1954, pp. 100, bibl. 50, illus.
Apple, apricot, cherry, peach, pear and plum varieties and rootstocks.

q MALIGA, P.
Befruchtungsverhältnisse des Jonathanapfels. **(Fertilization of the Jonathan apple.)**
[Russian and English summaries 1¼ p. each.]
Acta agron. Hung., 1956, **6**: 287-305, bibl. 10.
For Hungarian original see *H.A.*, 26: 2470.

r Miller, C. R.
The fruit areas of America. Appalachia—the land beyond.
Amer. Fruit Gr, 1956, **76**(11): 14-15, 26, illus.
Chiefly apples, with cherries and peaches.

s Ministry of Agriculture, London.
Management and manuring of orchard soils.
Adv. Leafl. Minist. Agric. Lond. **329**, revised 1957, pp. 6.
Apples, pears, cherries and plums.

t Ministry of Agriculture, London.
Orchard renovation and improvement.
Adv. Leafl. Minist. Agric. Lond. **333**, revised 1957, pp. 4.

u Mišić, P. D.
Prilog proučavanju degeneracije muških polnih elemenata u procesu mikrosporogeneze šljive crvene ranke. (**Studies on the microsporogenesis of the indigenous plum variety Crvena Ranka.**) [English summary ½ p.]
Arh. poljopr. Nauke, 1956, **9**(24): 76-80, bibl. 8, illus.

v Morettini, A.
Il calendario delle fioriture e delle maturazioni di alcune delle principali varietà di pesco. (**Flowering and ripening dates of some of the main varieties of peach.**)
Riv. ortoflorofruttic. ital., 1957, **41**: 3-8, bibl. 3.
For 90 varieties grown at the plant-breeding station at Florence.

w Neumann, D.
Das Standortproblem und die Standortforschung im Obstbau. (**The problem of locality and locality research in fruit growing.**)
Arch. Gartenb., 1956, **4**: 167-77, bibl. 20.
A review of the literature with suggestions for research.

x Nilsson, F.
Forskning och försök med frukt och bar i Polen. (**Top and small fruit research in Poland.**)
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 31-42, illus.

y Nyhlén, Å.
Sjukdomar och skador vid lagring av äpple. Resultat fran SPF:s lagringstävlingar 1944-1952. (**Fungal and physiological diseases of stored apples. Results of fruit storage trials by the Swedish Pomological Society 1944-1952.**)
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 117-32.
See also *H.A.*, 26: 232.

z Popenoe, J., and Scott, L. E.
Some effects of potassium nutrition and fruit load on the peach as indicated by foliar analysis.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 56-62, bibl. 16.
See *H.A.*, 26: 2461, but in line 1 on p. 364 for 'increased' read 'decreased'.

2183.
a Prew, H. A.
Grassing down of orchards in Auckland District.
N.Z. J. Agric., 1957, **94**: 57-65, illus.
Seed mixtures, management, advantages and disadvantages.

b Rebour, H.
Le néflier du Japon. (**The loquat.**)
Fruits et Prim., 1956, **26**: 446-7.
Cultivation in Algeria, rootstocks, varieties and diseases.

c Reichel, M.
Untersuchungen über Pflegeaufwand und Ertragsverlauf bei Strassenbäumen. (**Studies on the care of and yields from roadside trees.**)
Dtsch. Gartenb., 1957, **4**: 43-5, bibl. 1, illus.
Costs of pruning, spraying and manuring standard apple and pear trees are compared.

d Schwartze, C. D., Myhre, A. S., and Dodge, J. C.
Tree fruit and berry varieties for the Puget Sound region of Western Washington.
Stats Circ. Wash. agric. Exp. Stats **279**, 1956, pp. 3.
Listed according to proposed use.

e Smirnova-Garaeva, N. V.
Cultivation of mulberry for sericultural purposes in the Ukrainian S.S.R. [Russian.]
Bot. Žurnal, 1957, **42**: 462-3.
Optimum conditions described.

f Smock, R. M.
Recent developments in the storage of apples.
St. hort. Ass. Pa News, 1957, **36**: 12-13, 15-16.
Discussion on the merits of gas storage and on scald control.

g Tao, J.-T.
The peach—earliest fruit tree cultivated in China.
Indian J. Hort., 1956, **13**: 158-60, illus.
A few notes on peach growing in China.

h Veneroso, G.
Studio chimico-morfologico della foglia di alcune cultivar di *Morus alba* L. (**Chemical and morphological study of leaves of some varieties of *Morus alba*.**) [English summary 1¼ p.]
Ann. Sper. agrar., 1957, **11**: 257-80, bibl. 23, illus.

i WEISSENBORN, K.
Die Bemessung der Stickstoffgaben im Obstbau mit Hilfe der Blattanalyse. **(The measurement of N applications in fruit growing with the help of leaf analysis.)**
Sonderh. Landw. Forsch. **9**, 1957, pp. 60-7, bibl. 44.
Factors affecting leaf analysis discussed.

j ZUCCHINI, M.
Organizzazione della frutticoltura nel ferrarese. **(Organization of fruit growing in Ferrara.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 9-23.
Apples, pears, peaches, plums, etc.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 2054, 2061, 2088r, 2092-2094, 2127, 2142, 2182x, 2183d, 2240d, n, v, w, 2241h, i, 2556h, 3000, 3015.)

2184. KUZ'MIN, A. JA., ČUVAŠINA, N. P., AND ŽIRONKIN, I. M.
The first tetraploid plants of currants. [Russian.]
Agrobiologija, 1956, No. 5, pp. 108-13, bibl. 11, illus.
Tetraploid plants of currants. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1956, **21**(10): 23-8, illus.

Tetraploid plants were obtained from a spontaneously produced tetraploid branch of a diploid hybrid between the red currant Kyzyrgan ♀ and the black currant Davison's Eight ♂. The berries of the tetraploid form are large with normally developed seed, but the plants, on account of weak growth, frost susceptibility, late bearing and low yield, are of no practical value. The seedling progeny bred true with regard to these characteristics.

2185. KNIGHT, R. L., AND KEEP, E.
Fertile black currant-gooseberry hybrids.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 73-4, bibl. 11, illus.

Treatment with 0·6% colchicine of seedlings of the cross Boskoop black currant × Green Ocean gooseberry has resulted so far in the production of 2 fertile polyploid or mixoploid hybrids which have been successfully backcrossed to both gooseberry and tetraploid black currant. It is thought unlikely that the hybrids will be of direct commercial value, but they represent a first essential step in a planned transference of spinelessness to the gooseberry by backcrossing.

2186. SCHANDERL, H.
Experimentelle Untersuchungen über den Einfluss der Honigbienen auf den Ertrag der Kultursorten von *Ribes nigrum*. **(Experimental studies on the effect of honey bees on the yield of cultivated varieties of *Ribes nigrum*.)**
Gartenbauwiss., 1956, **3**: 284-91, bibl. 5, illus.

In the 3 black currant varieties studied nectar secretion appeared to be sufficient for attracting bees. In 1955 yields from bee-visited plants were 2·5 to 3·8 times those of caged plants, and in 1956 yields were increased 10·9 to 17·3 times.—Inst. Bot., Geisenheim/Rhein.

2187. SMITH, W. H.
Accumulation of ethyl alcohol and acetaldehyde in blackcurrants kept in high concentrations of carbon dioxide.
Nature, 1957, **179**: 876-7, bibl. 3.

Freshly picked black currants were kept for four weeks at 4·4° C. in a continuous flow of various carbon dioxide-oxygen-nitrogen mixtures. Graphs illustrating the ethyl alcohol and acetaldehyde accumulation in the fruits show that the ratio alcohol : aldehyde is at the end of the storage period greater than 50 : 1. It seems that the comparatively low concentration of acetaldehyde occurring in these black currants, even after prolonged exposure to the gas mixture, is insufficient to have a toxic effect on the fruit. It would also seem that black currants can withstand relatively high concentrations of ethyl alcohol for some time without manifest ill-effect. Further it is noted that the rate of production of alcohol and acetaldehyde increases as the concentration of oxygen decreases. Fungal rotting was completely suppressed in the 50% CO_2 mixtures, was almost negligible in the 25% CO_2 mixture, but was extensive after the first week in air.—Ditton Lab., Food Invest. Organ., D.S.I.R., Larkfield, Maidstone, Kent.

2188. BELL, H. P.
The development of the blueberry seed.
Canad. J. Bot., 1957, **35**: 139-54, bibl. 16, illus.

The work is in continuation of that on flower development in *Vaccinium angustifolium* var. *laevifolium*, reported in 1955 [*H.A.*, 26: 1471]. Pollen tubes needed about 4 days to grow from stigma to ovule. Out of a random representative collection of 1,075 berries the average number of seeds per berry was 64·2, of which 49·9 were imperfect. More complete pollination increased the percentage of normally developing ovules. Development of perfect seed followed a familiar pattern. Both familiar pattern and unfamiliar features resulting in imperfect seeds are described and illustrated.

2189. SHUTAK, V. G., HINDLE, R., AND CHRISTOPHER, E. P.
Factors associated with ripening of highbush blueberry fruits.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 178-83, bibl. 11.

The effects of light and temperature on blueberry ripening were noted. Enclosing in light-proof aluminium foil bags reduced early ripening, but all berries, covered and uncovered, were mature on the last picking date. Temperature had considerable effect on ripening and at suitable temperatures berries were induced to develop blue colour in both light and darkness. Soluble solids increased with change in colour from green to red to blue.—R.I. agric. Exp. Stat., Kingston.

2190. SAZYKIN, U. V.
Nectar secretion in gooseberries and black currants. [Russian.]
Pchelovodstvo, 1953, No. 3, pp. 43-6, from abstr. in *Bee World*, 1957, vol. **38**, abstr. 56/57.

The average amount of sugar secreted by one flower (for 4 varieties of gooseberry for 4 years) was 1·07–1·72 mg./day. Nectar secretion lasted from 3 to 5 days, depending on the variety. The sugar concentration in the nectar of black currants varied from 13·8% to 35%, average 21·8%. The amount of sugar secreted by one flower (3-year average) was 1·4–2·7 mg./day. [For work on other fruits see *H.A.*, 27: 1128.]

2191. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med beskaering af stikkelsbaerbuske. **(Gooseberry pruning trials.)**
Erhvervsfrugtavl., 1957, **23**: 193-4.

All three methods of pruning gooseberries tested were found to reduce yields in comparison with untreated bushes. For the sake of pest and disease control as well as for fruit quality, however, some pruning is considered necessary. Light to medium thinning of the bushes is recommended. Data on yields and fruit size are tabulated, the trials having been carried out at Virum and Hornum from 1951 onwards.

2192. WHITING, G. C.
Occurrence of shikimic acid in gooseberry fruits.
Nature, 1957, **179**: 531, bibl. 10.

In a survey of the organic acids of fruits the author found shikimic acid in considerable amount in each of the gooseberry varieties examined. The determination of the acid is described. Its weight in the fruit has been shown to remain practically constant from the under-ripe to the fully ripe stage six weeks later. The co-existence of shikimic acid with quinic acid, the presence of which in gooseberry fruits was also detected, is thought to be extensive in plant tissues, although the metabolic function of these acids is still unknown.—Long Ashton Res. Stat.

2193. BRITTON, D. M., AND HULL, J. W.
Mitotic instability in *Rubus*.
J. Hered., 1957, **48**: 11-20, bibl. 16, illus.

The problem of decreasing chromosome numbers in a group of mitotically unstable *Rubus* seedlings [see *H.A.*, 27: 1189] has been overcome by annual asexual propagation of the top of the plant by leaf-bud cuttings. —Md agric. Exp. Stat.

2194. KUMINOV, E. P.
Everbearing raspberry. [Russian.]
Agrobiologija, 1956, No. 5, pp. 148-9.

Wild local raspberries brought into cultivation in Siberia are often frost damaged and produce fruit on the current season's canes. They are being used as initial material for the development of everbearing varieties.

2195. SAHLSTRÖM, H.
Ett försök med nedskärning av hallonskott vid plantering. **(An experiment on the cutting back of raspberry canes at planting.)** [English summary 10 lines.]
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 113-16, illus.

Cutting back raspberries at planting to 25 cm. gave slightly higher yields than the controls and 3 other treatments, but the differences were not significant. The trials were carried out with two varieties at Alnarp from 1954 to 1956.

2196. BERENDEJ, A. E.
Changes in the heredity of strawberry hybrids under the influence of mentors. [Russian.]
Agrobiologija, 1956, No. 6, pp. 59-62.

Three strawberry hybrids of different ages were grafted on runners of several varieties. At first the scions were not allowed to develop either roots or leaves but later they were allowed to root and foliate and were then detached and grown normally. The different mentors [rootstocks] are stated to have affected the number, shape and size of leaves, and size, flavour and yield of fruits. The mentor effect was most marked on young hybrids, while those grafted during their third year of fruiting showed no appreciable changes.

2197. WORTHINGTON, T., AND SCOTT, D. H.
Strawberry plant storage using polyethylene liners.
Amer. Nurserym., 1957, **105**(9): 13, 56-7, illus.

Tests were carried out on the cold storage of strawberry plants at 30±1° F. packed in standard wire-bound crates as follows: (1) with moist sphagnum moss; (2) with polythene liners and moist sphagnum moss; (3) with polythene liners but no moss. Nine varieties were used, and were stored from December–February until November. On removal from storage plants stored in crates with polythene liners, with or without moss, were superior in leaf and root appearance to those stored without polythene liners. No decay was found in any of the plants stored in polythene without moss, but 1 variety developed 45% decay in polythene with moss and 87% in moss without polythene. Polythene liners prevented desiccation. Percentage survival after planting out was as follows: polythene without moss, 92; polythene with moss, 90; moss without polythene, 74. Precautions to be taken when using polythene liners are noted.—U.S.D.A., Beltsville, Md.

2198. ROGERS, W. S.
Saving costs by hill-mat planting.
Grower, 1956, **46**: 766-7.
More economical strawberry planting.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 173-4, illus.

Where certified, special-stock, virus-free plants are used the new hill-mat system makes substantial savings possible in the costs of planting and early cultivation. The method involves planting at 36 in. square, cultivating both ways until runners are ready to root in June or July and then laying the runners to form matted rows 18 in. wide.

2199. Rogers, W. S., and Wilson, D. J.
Strawberry cultivation studies. IV. Developments in matted systems.
J. hort. Sci., 1957, **32**: 99-107, bibl. 3, illus.

The use of the natural runnering habit of strawberries to form matted rows and matted beds of the varieties Huxley and Auchincruive Climax is shown to lead to higher yields than are given by spaced rows of original plants, so long as soil moisture is adequate. This confirms previous findings with the variety Royal Sovereign. In dry years, when the estimated soil moisture deficit (for full cover) exceeded 4 in. at strawberry picking time, wilting occurred first in the matted beds, next in the matted rows, and lastly in the spaced rows. Under these conditions, marked improvements in yield followed irrigation with ½ in. or 1 in. of water. The improvement was greatest in the matted beds and rows. Over the whole series of experiments matted rows yielded more heavily than spaced rows, whether irrigated or not. Matted rows are recommended for conditions similar to those at East Malling. Matted beds are not recommended because of the risk of wilting and the difficulties of management. It was shown that matted rows and beds formed from mother plants 36 in. apart in the row (the hill-mat system [see preceding abstract)] yielded as well as those formed from mother plants only 18 in. apart in the row. [From authors' summary.]—E. Malling Res. Stat.

2200. Roberts, A. N., and Kenworthy, A. L.
Growth and composition of the strawberry plant in relation to root temperature and intensity of nutrition.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 157-68, bibl. 19.

Experimental methods are discussed. Normal growth occurred in the Robinson strawberry with 0·5 and 1·0 concentration of Hoagland nutrient solution. Regardless of nutrient solution maximum growth of all aerial parts during vegetative development occurred at root temperatures of 65 and 75° F. Root temperature increase resulted in a significant increase in K in the leaves, but otherwise did not appear to affect the content in other elements. Significant negative correlations were found in both leaves and roots between N-free extract and protein, between total ash and N-free extract and between K and N-free extract.—Corvallis, Ore., and East Lansing, Michigan.

2201. Matzner, F.
Der Einfluss einer Volldüngung mit Sulfaten und Chloriden auf Ertrag und Zusammensetzung der Erdbeeren der Sorten Dresden und Sachsen. **(The effect of a complete fertilizer containing sulphates or chlorides on yield and composition of fruits of the strawberry varieties Dresden and Sachsen.)**
Arch. Gartenb., 1956, **4**: 320-38, bibl. 20.

(1) The application of $N+P+KCl$ caused a significant reduction in yield as compared with $N+P+K_2SO_4$, unmanured controls giving the highest yields. (2) Mineral fertilizers increased the dry matter content of the fruit, there being no significant difference between KCl and K_2SO_4. (3) With Dresden, fertilizers increased the sugar content, but again there was no significant difference between the two forms of K. (4) Manuring had little influence on acid content, especially in the case of Dresden. (5) Sachsen had a 40% higher total acid content and a 60% higher ascorbic acid content than Dresden. This finding suggests that ascorbic acid content may be related to total acid content. With the exception of $N+P+KCl$ in the case of Sachsen (highest value 101·00 mg./%) fertilizers did not increase the ascorbic acid content above that of unmanured controls.—Inst. Bot., landw.-gärtn. Fak., Humboldt-Univ. Berlin.

2202. Dennison, R. A., and Hall, C. B.
Influence of nitrogen, phosphorus, potash and lime on the growth and yield of strawberries.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 224-8, bibl. 3.

Pot experiments were carried out to study growth and yield responses of strawberries to N, P, K and lime applied to a virgin and an old strawberry soil. Both soils were fumigated before planting. The 100 lb. rate of N yielded significantly more fruit and produced larger plants than the zero or 50 lb. rates. On virgin soil yields were increased and larger plants were produced by applying 80 or 160 lb. of P_2O_5 compared with no P_2O_5. On old soil P_2O_5 applications induced no response. Both rates of lime application (1,200 and 2,400 lb. per acre) increased yield and plant growth on the virgin soil which had a low pH, but reduced growth and yield on the old soil.—Fla agric. Exp. Stat., Gainesville.

Vines.

(*See also* 2142, 2158, 2240b, e-i, k, o, 2241c, d, f, k, 2341n.)

2203. Vega, J.
Argentine. Rapport national. **(Argentina. National report.)**
Bull. Off. int. Vin, 1956, **29**(310): 45-64.

Viticultural work done or in progress on: varietal ecology, green pruning, rootstock propagation, nutrition, treatment after frost injury, floral biology and breeding. Results are given for pruning and nutrition experiments, the latter concerning uptake of N, P and K from flowering to fruit ripening. [See also note 2241k.]

2204. Cherubini, C., and Gonzales, F.
Obtention de nouvelles variétés de vigne sans pépins. **(Production of new seedless varieties of vine.)**
Bull. Off. int. Vin, 1957, **30**(311): 64-7, bibl. 8.

Promising seedless table-grape hybrids have been produced in Argentina by crossing good varieties with seedless Sultanina blanche and Sultanina rosée. Results are given in detail.

2205. Zankov, Z. D.
Accelerated fruiting of vines raised from seed by applying optimum cultural techniques. [Bulgarian, with Russian summary ½ p.]
Nauč. Trud. Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1954, **2**: 121-6, bibl. 17, illus.

Rapid hybrid seedling development is important for breeding. A description is given of a succession of cultural practices, starting with seed storage and sowing *in situ*, resulting in high yields in the third year.

2206. HIDALGO, L.
Equivalentes metereológicos de la vid. **(Meteorological equivalents of the vine.)**
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 175-209, bibl. 36, maps.

Meteorological equivalents are defined as the mm. of rainfall, degrees of temperature, etc., which differentiate abnormal from normal situations in respect of cropping, the normal being confined within the limits of 2 equivalents. Such equivalents for rainfall and temperature were determined for each of the vine growing districts of Spain and for each of the phases of the vegetative cycle of the vine. Isoequivalent lines for these phases are traced across maps of Spain. By this means the relative frequency of good, normal and deficient crops can be determined.—Estac. Ampelog. Vitic.

2207. BERÉNYI, D., AND JUSTYÁK, J.
Fenológiai felvételezés hegyvidéki szőlőállományban. **(Phenological survey of hillside vineyards.)**
Időjárás, 1956, No. 2, pp. 104-11, from abstr. in *Hung. agric. Rev.*, 1956, **5**(3): 11.

On the basis of experiments and observations in the Tokaj-Hegyalja region a method for the phenological survey of vineyards on slopes has been developed. A statistical analysis of the results enables differences in both plant and soil to be evaluated solely on the basis of such a survey.

2208. BRANAS, J., AND VERGNES, A.
Morphologie du système radiculaire. **(Morphology of the root system [of vines].)**
Progr. agric. vitic., 1957, **147**: 29-32, bibl. 2; 94-104, bibl. 1; 122-9; 147-58, illus.; 173-183; 203-9.

Methods of studying roots; factors affecting their development and distribution; varietal differences; effects of plant spacing; ageing of roots; comparison of root growth and top growth; root distribution in rootstocks and their resistance to deficiency and excess of moisture.

2209. ANON.
Le radici della vite. Originali osservazioni sull'andamento e sul volume in relazione ai terreni, ai tutori ed ai lavori. **(Vine roots. Original observations on their distribution and bulk in relation to soil, supports and cultural practices.)**
Ital. agric., 1955, **92**: 546-9, illus.

European and some American seedling vines root more deeply than the supports on which they may be grown. Maple is a less competitive support than elm, ash, cherry, pear or olive. Frequent shallow cultivation, especially in winter, is better than occasional deeper cultivation. Examples of root distribution are quoted for different soil types.

2210. PEYER, E., AND ZWICKY, P.
Versuche in der Rebschule mit Bodenheizung, Bodenbedeckung und Rebenveredlung. **(Studies in the vine nursery with soil warming, soil covers and vine grafting.)** [English, French and Spanish summaries 6–8 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 57-66, bibl. 3, illus.

Studies on work with graft-cuttings reported earlier [see *H.A.*, 26: 2539] have been continued. Electric heating with wire netting improved yields of saleable grafts, but the increase was not economic. Increasing the width of the wire netting improved yields. Soil covers of colourless polyethylene gave more profitable results than electric soil warming. Rooting was better after 12 weeks' soil covering than after 6 weeks'. Machine grafting was preferable to grafting by unskilled labour.—Eidg. Versuchsanst., Wädenswil.

2211. SHEPARD, P. H.
Greater yields from grafted grapes.
Amer. Fruit Gr, 1956, **76**(10): 12, illus.

The vine rootstocks U.S.3309, U.S.125-1 and Constantia were used for grafting Moore Early, Concord, Delaware and Campbell Early. Yields from all varieties on rootstocks were superior to those on their own roots, especially those of Campbell Early. The grape varieties Lindley, Barry, Herbert and Merrimac were more productive and the flowers were more self-fertile when on these rootstocks. Promising results were also obtained with 3 native species as rootstocks.—Miss. St. Fruit Exp. Stat.

2212. KAZAS, I. A., AND GORKAVENKO, A. S.
The use of hydraulic borers for planting vines. [Russian.]
Sad i Ogorod, 1957, No. 1, pp. 72-4, illus.

In the Odessa region planting holes for vines were successfully prepared by hydraulic borers of 1·5–2 in. in diameter with a water pressure of 1·5–2 atmospheres. A 3,000 l. tank mounted on a lorry supplied the water to 3 borers through 25–30 m. long hoses. About 3–3·5 l. water was used for each hole and the cuttings or young plants were set in the slurry left in the holes. Planting by this method was 7–8 times faster than by hand and could be combined with fertilization.

2213. SOBOLEV, N. K., AND SARMAKEŠEV, G. S.
Mechanization of vine planting. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 1, pp. 50-1, illus.

On collective farms in the Don region planting holes were made for vines with hydraulic borers with 2 in. nozzles. A 750 l. tractor-mounted tank supplied the water of which 2·5 l. was needed for each hole. By this method the rate of planting was speeded up and very favourable conditions for growth were created.

2214. ABITBOL, J., AND MAINSTEIN, P.
L'alimentation minérale de la vigne. Caractéristiques spéciales de vignes américaines et européennes. **(Mineral nutrition of vines. Special characteristics of American and European vines.)**
Bull. Off. int. Vin, 1956, **29**(310): 64-5.

During the period up to flowering the uptake of major nutrients was higher in American than in European vines grown in Argentina, but the situation was reversed during fruit development and ripening. Curves for K showed maxima and minima instead of the progressive reduction found at Montpellier in France.

2215. SHAULIS, N., AND KIMBALL, K.
The association of nutrient composition of Concord grape petioles with deficiency symptoms, growth, and yield.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 141-56, bibl. 17.

Using data taken from field trials in New York State from 1944–53 the authors discuss the relation of petiole composition in the Concord grape vine to vine growth, yield and deficiency symptoms. For N, K and Mg data are presented on the critical levels of concentration in the petioles. No deficiency symptoms were noticeable at even the low levels of P and Ca reported in these trials.—N.Y. St. Exp. Stat., Geneva.

2216. COOK, J. A., AND KISHADA, T.
Petiole nitrate analysis as a criterion of nitrogen needs in California vineyards.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 131-40, bibl. 4.

In these trials with Thompson Seedless vines the blossom time nitrate content of petioles was found to be inversely correlated to a highly significant degree with yield response obtained after 2 years' N application, the lower the initial nitrate level, the greater being the yield response. With vineyards already high in nitrate, fertilizer depressed yield below that of the controls. The inverse relationship is valuable. Work is in progress to determine its applicability to other varieties.—Univ. Calif., Davis.

2217. ALEXANDER, D. M.
Seasonal fluctuations in the nitrogen content of the sultana vine.
Aust. J. agric. Res., 1957, **8**: 162-78, bibl. 19.

Estimates were made of dry matter and N contents of parts of sultana vines sampled at frequent intervals from October to January in one season and January to July in the following season. From early October until the commencement of leaf drop in February there was a linear increase in the amount of N in the annual aerial growth. This N was present mainly in the laminae and fruit. After February the amount of N in the fruit continued to increase while that in the leaves decreased. The loss from the leaves could be partly accounted for by translocation to fruit or woody tissues and the remainder by leaf fall. The data obtained gave no indication of the best time for applying N to sultana vines. The amount of N in stems, and also the percentage of N in trunks, main roots, and feeder roots, increased to July, which suggested that root absorption from the soil continued throughout autumn. It is suggested that the total N content of laminae gives the most reliable indication of seasonal N uptake, provided that due allowance is made for time of sampling. [Author's summary.]—Commonw. Res. Stat., Merbein, Vict.

2218. ZANKOV, Z. D., AND GJUROV, G.
Soil studies in connection with growing self-rooted varieties of vine. [Bulgarian, with Russian summary 1 p.]
Nauč. Trud. Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1956, **3**: 197-205.

Soils suitable for growing vines on their own roots were found in the Septemvri Station region to be those containing over 60% sand (1–0·1 mm.), and in the Krumova Station region those containing 50% sand, in which, during the winter, the water table rose to 1·5–2·0 m. or the land was subjected to periodic flooding.

2219. ERGESJAN, R. A.
Shoot and root growth in vines during the first year after planting in relation to pruning of the planting material. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 2, pp. 38-43, bibl. 2, illus.

Experiments in the Armenian S.S.R. on 2 vine varieties have shown that cutting back the planting material to 2 or 3 canes with 2–3 buds each resulted in better shoot and root growth than cutting back to 1 cane with 2–3 buds or the same method followed by early pinching back of new shoots.

2220. PIROVANO, A.
La potatura ad archetto della vite. (**Arching as a suitable method of training vine shoots.**)
Frutticoltura, 1957, **9**: 25-8, illus.

The author considers that a modified arching technique coupled with suppression of some of the resulting buds has proved its worth in the vineyard.

2221. ANTCLIFF, A. J., WEBSTER, W. J., AND MAY, P.
Studies on the sultana vine. V. Further studies on the course of bud burst with reference to time of pruning.
Aust. J. agric. Res., 1957, **8**: 15-23, bibl. 7.

Further studies on the course of bud burst were made on three sites in the Sunraysia district and the effect of three times of pruning on time of bursting investigated over a period of three seasons. The largest differences in time of bursting were between seasons with smaller differences between sites and an interaction between sites and seasons. Vines pruned on August 11 burst about 3 days later than vines pruned in June 4 or July 8. The June-pruned vines burst earlier than the July-pruned vines at bud positions 13 and 14 only. The trends of the bud position means for time of bursting, bud burst, and fruitful shoots on the one site on heavy soil differed from the other two sites on sandy soils which were very similar. The three sets of deviations appeared to be related. Data obtained on the proportion of buds producing two shoots suggested that this was positively related to nitrogen. [Authors' summary.]—Commonw. Res. Stat., Merbein, Vict. [For part IV see *H.A.*, 27: 223.]

2222. BERNSTEIN, Z., AND KLEIN, S.
Starch and sugar in canes of summer-pruned *Vitis vinifera* plants.
J. exp. Bot., 1957, **8**: 87-95, bibl. 13.

Plants of *Vitis vinifera*, var. Chasselas Doré, were summer-pruned at various times after harvest in order to secure a second, winter crop. Dry weight, starch content, reducing sugar and non-reducing sugar contents in canes of such treated plants were determined from July 1953 until February 1954. As controls, normally winter-pruned plants were used. Highest fertility was found in the latest-pruned plants, which also gave the largest yields. The earliest-pruned plants had the lowest fertility and gave the smallest crop. Dry weight in the controls was highest during September, and dropped somewhat during January and February. In the summer-pruned vines dry weight decreased immediately after pruning and rose again at the end of the induced growth-period. Starch content in the controls increased strongly from the beginning of the experiments until November, decreased afterwards and rose again in January. Starch content of all the treated vines, independently of time of summer pruning, followed mostly the trend of the starch content of the controls, but differed from it by being at a minimum in November and by not rising in January. The trend in the reducing and non-reducing sugars content was similar in the treated and non-treated plants. However, there was always a temporary decrease in sugar immediately after the pruning. In all the plants there was an increase in the reducing sugars in February and at the same time a decrease in the non-reducing sugar. No starch-sugar conversion could be found during the winter period. [From authors' summary.]—Jordan Valley exp. Stat., Kinnereth, Israel.

2223. Dyment, R.
Pruning trailer keeps them warm!
Amer. Fruit Gr, 1956, **76**(10): 14, illus.

A movable tent erection supported by a tractor provides shelter and warmth for workers while pruning vines.

2224. Grozdanov, R.
Shredders for preparing fodder from vine shoots. [Bulgarian, with Russian summary 1 p.]
Nauč. Trud. selskostop. Akad. Georgi Dimitrov., Sofia, 1952, **1**: 85-96, bibl. 8, illus.

Good quality fodder was obtained from the top third of vine shoots cut immediately after harvest, shredded and ensilaged. Of 4 machines tested the silage shredder produced by the V. Kolarov works was found to be the most satisfactory.

Nuts.

(*See also* 2092, 2117, 2133, 2182b, 2240a, c, j, l, m, p-u, x-z, 2241a, b, e, g, j, 3000.)

2225. McDaniel, J. C.
Nut germination observations, 1955-1956.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 138-42, bibl. 5.

Greenhouse tests were made on the germination of unstratified nuts of pecan, hican, bitternut, shellbark, shagbark, hazel, heartnut and Persian walnut. It was found that a number of northern pecans, as well as hybrids of pecan with 3 different hickory species, and the shellbark and bitternut hickories will germinate readily under conditions of greenhouse culture, and, like the southern pecan varieties, do not need a previous exposure to a period of low temperature under moist conditions. The Carpathian strain of Persian walnut also gave fair to good germination, but Wright heartnut, *Corylus jacquemontii* and shagbark hickory failed to germinate. The results are discussed in relation to the literature.—Univ. Ill., Urbana.

2226. Gossard, A. C.
Effect of the pollen parent on Chinese chestnut seed.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 38-42, bibl. 3.

Pollens from different Chinese chestnut seedling trees produce differences in the percentage of fully developed burs resulting from controlled crosses, and in the number of nuts per bur. A positive correlation exists between the percentage of pollinated blossoms producing fully developed burs and number of nuts per bur. This correlation may be affected by external factors such as weather and time of pollinating. A negative correlation exists between the number of nuts per bur and the average weight of the nuts. Different pollens affect the weight or size of the seed produced by the same female parents. When not caused by other factors, this difference in size of seed is due to the direct effect of pollen on the embryo of the resulting nut, and constitutes xenia. [Author's conclusions.] —U.S.D.A., agric Res. Serv., hort. Crops Res. Branch, Meridian, Miss.

2227. McKay, J. W.
Orange-kernel chestnut.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 45-7, bibl. 2.
Orange-colored chestnuts.
Agric. Res. Wash., 1957, **5**(10): 16.

It was observed that some of the nuts of 3 seedling Chinese chestnut trees had orange kernels. The frequency of occurrence of the new character in open-pollinated nuts of the 3 trees varied from 2 to about 6%; in crosses between two of the trees the frequency of occurrence was increased to as much as 24%. The total carotenoid and carotene contents of the new nut type were substantially higher than those of normal nuts and were associated with orange colour of the kernel. Procedures outlined and described may make it possible to produce true-breeding types.—Hort. Crops Res. Branch, agric. Res. Serv., U.S.D.A., Beltsville, Md.

2228. Šobek, J.
Výběr vhodných odrůd lísek. **(Selection of suitable varieties of hazelnuts.)** [English, Russian and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 1083-92, bibl. 5, illus.

A long list of hazelnut varieties grown in Czechoslovakia is given, of which 15 are considered to be the most suitable and a further 7 to be satisfactory. It is recommended that hazelnuts should be planted where, apart from nut production, they would have an anti-erosive function (i.e. on slopes, along brooks, etc.) or to supplement other fruit species.

2229. Ferguson, A. B.
Attempts at rooting nut trees by mist propagation.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 89-90.

Under constant mist cuttings of *Corylus* spp. formed good callus tissue but did not root. A fairly low percentage (10 to 20%) of rooting occurred with hazel cuttings under alternate mist.

2230. Crane, H. L., and McKay, J. W.
Effects of fertilizers on filberts on a magnesium-deficient soil under drought conditions.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 58-62, bibl. 1.

Reed and Potomac varieties were grown under clean cultivation on sandy and gravelly loams. Differential fertilizer treatments were given with N, P, K and Mg at 2 levels. Many of the trees died during the experiment as a result of drought conditions and the application of the fertilizer treatments before the trees were established. There was higher mortality with than without N and K applications. Applications of P and Mg helped the trees to survive the adverse conditions and reduced leaf scorch. At both levels of N, P and K increasing the Mg level reduced the number of trees that died and the occurrence of leaf scorch.—Agric. Res. Serv., U.S.D.A., Beltsville, Md.

2231. Weschcke, C.
Nursery technique in hickory and walnut propagation.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 68-71.

Tests have indicated that hickories are compatible on shagbark stock but that shagbark is slow growing and does not transplant easily. Some varieties of hickory are incompatible on bitternut stock. It is suggested that Beaver or Fairbanks hybrids or Rockville hican should be used as an intermediate between shagbark scions and bitternut stocks. A walnut variety [unnamed] has been discovered which will produce trees that can be grafted in the second season from seed.

2232. Gossard, A. C., and Crane, H. L.
Germination of pecan nuts.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 84-9, bibl. 7.

Tests on the factors affecting germination of pecan nuts were carried out, using Stuart, Moore and Waukeenah varieties. The highest percentage germination and most vigorous seedling growth was obtained at 85° F. Significant differences in germination percentages and seedling vigour were directly correlated with the specific gravity of the nuts. There was no marked difference in the percentage germination of nuts stored at different temperatures, during the period of highest germination (early January to early May). After this period the germination percentages of warm-stored nuts showed a marked drop, while some nuts from cool storage remained viable for at least 2 years. Rancidity developed sooner during storage at higher temperatures. The earliest stage at which nuts would germinate was about 3 weeks before maturity. There was no apparent post-harvest rest period required before the nuts would germinate.—Agric. Res. Serv., U.S.D.A.

2233. Hunter, J. H., and Hammar, H. E.
Variation in composition of pecan leaves.
Bett. Crops, 1957, **41**(2): 18-25, bibl. 7.

In pecan leaf analysis tests it was shown that nutrient contents were affected by crop condition of the trees sampled, the type of shoots sampled, the time of sampling and the variety. The K and P levels were more closely related to crop load than were other nutrient levels. Leaf K was highly correlated with crop load and reached low levels towards the end of the season in an "on" year, accumulating to normal levels in the subsequent "off" year. Nutrient balance varied with the 3 varieties sampled, and the differences appeared to be related to bearing characteristics. There are indications that the development of a practical method for nut thinning would help to solve nutritional problems.—U.S.D.A., Albany, Ga.

2234. Merendi, A.
Il pino domestico (*Pinus pinea* L.). **(The stone pine (*Pinus pinea*.).)**
Ital. agric., 1957, **94**: 65-76, bibl. 1, illus.

The edible seeds are of more commercial importance than the timber. Average yields are 3,000–4,000 kg. and maximal yields 7,000–8,000 kg. per ha. Harvesting and processing are described, also establishment and maintenance of plantations.

2235. McKay, J. W.
Walnut blossoming studies in 1956.
47th A.R. north. Nut Grs' Ass. 1956 New Haven, Conn., pp. 79-82.

The blossoming characteristics of a number of Persian and black walnut varieties and their hybrids are described in connection with a program to breed new walnut varieties. An extremely late-blossoming hybrid is described. This may be the starting point for further breeding of late-blossoming varieties of the Persian walnut type suitable for the East. [From author's summary.]—Hort. Crops Res. Branch, agric. Res. Serv., U.S.D.A., Beltsville, Md.

2236. Falch, J.
Untersuchungsergebnisse über die Walnuss-Veredlung im Freiland. **(Experimental results with walnut propagation in the open.)** [English, French and Spanish summaries 3–5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 82-8.

Walnut budding by the Geisenheim method was tested under Austrian conditions using *Juglans nigra* and *J. regia* as rootstocks. The most successful period for budding was from mid-June to the end of July. It is recommended that in the nursery the plants should be spaced at 1·20 m., with 50 cm. between the rows. Green grafting [see *H.A.*, 25: 2574] did not give satisfactory results.

2237. Newcomer, E. H.
The effect of high frequency sound waves upon the growth of walnut trees.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 47-8.

Ultrasonic treatment was given to the apical buds of 6 young, grafted, black walnut trees after the lateral growth had been pruned and when the trees were in full, green bud. Growth was greatly inhibited by this treatment. Cytological examination of other plants has shown that the cells of the growing point are internally disrupted by such treatment.—Univ. Conn., Storrs.

2238. LOPUŠANSKIJ, P. I., AND MOLOTKOVSKIJ, G. H.
Polarity and the dynamics of oil and vitamin C accumulation in the aerial parts of walnut. [Russian with French summary.]
Bjul. Mosk. o-va ispyt. prir., Otd. biol., 1956, **61**(1): 61-7, from abstr. in *Ref. Ž.* (*Biol.*), 1956, No. 22, abstr. 94402.

A study was made on the vitamin C content of the leaves and nuts and on the oil content of the nuts of walnuts grown in the vicinity of Černovice. The oil content of the nuts on the southern side of the tree was higher than that on the northern side. Nuts in the interior of the crown had the highest oil content. The oil content increased from the lowest branch to the highest. The lowest ascorbic acid content was found in nuts from the interior of the crown, and the highest in those from the northern side of the tree. The causes of these variations in ascorbic acid and oil contents are discussed.

2239. LOPUŠANSKIJ, P. I., AND MOLOTKOVSKIJ, G. H.
Polarity and distribution of ascorbic acid in walnut (*Juglans regia*) plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **103**: 723-6, bibl. 14, illus.

The ascorbic acid distribution in the walnut tree and its individual organs is described and schematically illustrated. The highest ascorbic acid content was found in the root collar and in the apex of young shoots.

Noted.

2240.

a BECKER, G.
Carpathian English walnut pollination observations in Michigan test orchards, 1956.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 82-9, illus.
Carpathian D has proved the best midseason to late pollinator for English walnuts.

b BERKAN, H.
Türkiye kuru üzüm ve incirlerinin Kimyasal terkipleri ve İspirto Randimanlari III. **(Analytical studies on raisins and dried figs.)** [English summary ½ p.]
Tekel Enst. Raporlari, 1956, 7: 80-3, bibl. 2.
Chemical composition of Anatolian fruits.

c BEST, R. B.
Pecans for the northern areas.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 54-7.

d BLOMMERS, J.
Glasa, de nieuwe glasaardbei. **(Glasa, a new strawberry for frame production.)**
Groent. Fruit, 1957, **12**: 775, from abstr. in *Beerenobstschrift.*, 1957, No. 6, pp. 3-4.
A variety for cold frames, ripening before Deutsch Evern.

e BRUNI, B.
Monica. **(The Monica grape.)** [English summary 7 lines.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 1, Suppl. pp. CI-CVIII, bibl. 10, illus.
A wine variety with black fruit.

f BRUNI, B.
Torbato. **(The Torbato grape.)** [English summary 7 lines.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 1, Suppl. pp. LXXXV-XCI, bibl. 6, illus.
A wine variety with yellow fruit.

g BUZIN, N. P.
Currant and raisin production. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 2, pp. 33-6, bibl. 1.
Notably in Uzbekistan; varieties listed.

h COSMO, I.
Si coltiva la vite in Cina? **(Are vines cultivated in China?)**
Agric. Venezie, 1957, **11**: 75-116, illus.
Areas, varieties and cultural practices.

i COSMO, I., AND POLSINELLI, M.
Registre ampélographique international. 7. Raboso piave. 8. Raboso veronese. **(International ampelographic register. 7. Raboso piave. 8. Raboso veronese.)**
Bull. Off. int. Vin, 1957, **30**(311): Suppl. pp. 6+6, bibl. 3, illus.
Full details of 2 Italian wine grape varieties.

j CRANE, H. L.
Larger crops of nuts with fertilizers.
47th A.R. north. Nut Grs' Ass., 1956, New Haven, Conn., pp. 95-9.
Fertilizer programmes.

k DEL GAUDIO, S., AND GIUSTO, D.
Ottavianello. **(The Ottavianello grape.)** [English summary 6 lines.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 1, Suppl. pp. XCIII-XCIX, bibl. 9, illus.
A wine variety with purple fruit.

l DILLER, J. D.
Is our American chestnut developing blight resistance?
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 29-31.
Preliminary report on a co-operative screening study.

m EVRÉINOFF, V. A.
Le pistachier: étude pomologique. **(The pistachio: a pomological study.)**
Fruits et Prim., 1957, **27**: 19-31, bibl. 9.
Including propagation, varieties, cultural requirements and pests and diseases.

n FALCH, J., AND STRAUSS, E.
Versuche über die gärtnerischen Möglichkeiten der Erdbeerkultur. **(Studies on the horticultural possibility of strawberry growing.)** [English, French and Spanish summaries 5–7 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 69-76, bibl. 4, illus.
Intensive culture in Austria; varieties Regina and Macherauchs Frühernte preferred.

o FERNÁNDEZ LETTRY, C. H.
Pieux pour vignes et pour treilles faits du bois de certaines variétés d'*Eucalyptus*. **(Stakes for vines and vine arbours made from wood of certain *Eucalyptus* varieties.)**
Bull. Off. int. Vin, 1956, **29**(310): 65-70.
Species suitable and preparation described.

p GELLATLY, J. U.
Tree hazels as hardy root stocks.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 90-2, bibl. 6.
For filberts in British Columbia.

q GELLATLY, J. U.
Tree hazels—*Corylus colurna*.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 110-12.
And hybrids with filberts.

r GELLATLY, J. U.
Filazels.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 112-13.
Filbert-hazel hybrids for windbreaks and nut production.

s GRAVES, A. H.
Thoughts on the future of the American chestnut tree.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 32-8, bibl. 7, illus.
Breeding for resistance to *Endothia parasitica*.

t GRAVES, A. H.
Chestnut breeding—report for 1955 and 1956.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 99-110, bibl. 7, illus.
Hybrids between American and Oriental species at Conn. agric. Exp. Stat.

u GUENGERICH, H. W.
Starking hardy giant pecan.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 50-1.
Large, thin-shelled and good quality.

v HULL, J. W., AND BRITTON, D. M.
Early detection of induced internal polyploidy in *Rubus*.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 171-7, bibl. 7.

w KAŠIČKINA, M. I.
The production of new strawberry varieties by I. V. Mičurin's method. [Russian.]
Zemledelie, 1955, 3(9): 41-4, illus.
Illustrated descriptions of varieties developed at Mičurinsk.

x LEFÈVRE, H. E.
Hardiness of filberts in Quebec.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 115-17.
Varieties listed.

y MCDANIEL, J. C.
The pollination of Juglandaceae varieties—Illinois observations and review of earlier studies.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 118-32.

z MACDANIELS, L. H.
Stock-scion incompatibility in nut trees.
46th A.R. north. Nut Grs' Ass. 1955, East Lansing, Mich., pp. 92-7, illus.
Symptoms described, particularly for chestnut, hickory and walnut.

2241.

a MCKAY, J. W., AND CRANE, H. L.
Two new pecan varieties for northern regions.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 53-4, bibl. 1.
Duvall and Sweeney.

b MERCURI, S.
Alcune considerazioni sulla coltura del nocciuolo in Italia. **(Some considerations on the growing of hazel nuts in Italy.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 59-65, illus.
Varieties; yields and use as pollinators.

c MERCURI, S.
La Clotilde Prosperi, uva da tavola eccellente. **(Clotilde Prosperi, an excellent table grape.)**
Ital. agric., 1957, **94**: 274-6, illus.
Large, amber-tinted, muscat-flavoured fruits.

d RANDE, B.
Le Négret de la Canourgue. **(The grape Négret de la Canourgue.)**
Progr. agric. vitic., 1957, **147**: 289-94, illus.
A wine variety with red skin and white flesh.

e RICHTERKESSING, R.
The Peruque pecan.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 51-2, illus.
Notes on the original tree in Missouri and its graft progeny.

f RODRIGO, P. A.
Grape culture in the Philippines.
Philipp. J. Agric., 1955 (issued 1957), **20**: 55-63, bibl. 7, illus.
Notes on problems and attempts being made to develop culture.

g SERR, E. F., AND FORDE, H. I.
Walnut breeding.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 184-44, bibl. 12.
With special reference to Payne, Hartley, Franquette and Conway Mayette as parents.

h VANICEK, K.-H.
Über sowjetische Erfahrungen im Erdbeeranbau. **(Russian experience in strawberry growing.)**
Dtsch. Gartenb., 1957, **4**: 77-8, bibl. 1, illus.
With recommendations on plant and blossoming thinning.

i VELIKANOVA, E. V.
Experimental production of fertile hybrids between two species of strawberry. [Russian.]
Bot. Žurnal, 1957, **42**: 102-6, illus.
Fragaria ananassa × F. moschata.

j ZARGER, T. G.
Status of tree crops investigations in the Tennessee Valley region.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 57-68, bibl. 14, illus.
Selection and testing of black walnut, blight resistant chestnut, filbert, Persian walnut and pecan.

k ZULUAGA, A., NIJENSOHN, L., AND PIZARRO, O. C.
Situation des travaux d'amélioration de la vigne et da sa culture. Rapport général (pour l'Amérique du Sud). **(Work in progress on improvement of vines and their cultivation. General report for South America.)**
Bull. Off. int. Vin, 1956, **29**(310): 33-42.
Practices and research in Argentina.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3024b.)

2242. GAMBRELL, F. L., AND GILMER, R. M.
Insects and diseases of fruit nursery stocks and their control.
Bull. N.Y. St. agric. Exp. Stat. **776**, 1956, pp. 50, bibl. 24, illus.

Descriptions and control measures for the principal insects and diseases of fruit nursery stocks in New York State are presented. The publication is based largely on field and greenhouse experiments conducted over the past six years. Research on some of the pests is being continued. Virus and virus-like diseases of stone and pome fruits are described and a virus disease control program for nurseries outlined. Recommended formulations and approximate timing of sprays for the control of the insects and diseases discussed are brought together in a summary table for ready reference. [Authors' abstract.]

Disturbances of nutrition or of unknown origin.

(*See also* 2117, 2341g, q, t, z, 2342o.)

2243. BAXTER, P.
Trace element deficiencies in fruit trees on Mallee and Wimmera soils.
J. Agric. Vict., 1957, **55**: 11-20, 26, bibl. 9, illus.

In Victoria, the Murray Valley is one of the main regions where irrigated horticulture is practised. Soils belong to the solonized, brown soil group (Mallee soils) and are highly alkaline and calcareous. These soils, as well as those of the adjacent Wimmera region are likely to induce deficiencies of iron, zinc and to a smaller extent copper and manganese in fruit trees. Unavailability is due to both high pH and high lime content and multiple deficiencies (e.g. zinc and manganese) also occur. Symptoms and treatments of zinc, manganese, copper and iron deficiencies are described. The second part of the article describes orchard trials to control lime-induced iron chlorosis, economically the most important nutritional disorder of fruit trees in this region and associated with alkaline soils of high lime and also high sodium content. Grapevines, almonds, apricots and, to some extent, citrus are less susceptible to iron chlorosis than other species. Dormant or leaf sprays of inorganic iron salts did not control this chlorosis, but limb or trunk injections of iron citrate capsules gave some measure of control. Leaf sprays with the iron salts of the chelates EDTA and HEEDTA caused leaf damage but little re-greening of leaves, but early season sprays of 0·5% FeDTPA were more successful. Orchard management practices which may prevent or alleviate iron chlorosis include the prevention of excess moisture and the maintenance of lucerne sward in the orchard. [Summary provided by author.]

2244. WERMINGHAUSEN, B.
Untersuchungen über den Ernährungszustand der Obstgehölze im Bodensee-Obstbaugebiet unter besonderer Berücksichtigung der Symptomatologie als Mittel zur Feststellung der Nährstoffversorgung. **(Studies of the nutrient status of fruit trees in the fruit growing area around Lake Constance, with special reference to symptomatology as a means of determining that status.)**
[*Mimeo.*] *Diss. techn. Hochsch. München*, [1956?], pp. 265, bibl. 642, illus.

The author discusses the value of symptomatology, used in combination with soil and leaf analysis, for determining disturbances in fruit tree nutrition. Symptoms of macro- and microelement deficiencies are described in detail, and similar symptoms induced by pests and diseases are described for comparison. The effects of climate, cultivation and soil treatment on the nutrient status of trees are also discussed. It was found that in the Lake Constance area 90% of the farms were inadequately fertilized, and that the soil pH in general was rather high. Mineral element deficiencies appeared more frequently on bush trees than on standard trees, and in trees on clonal than on seedling stocks. Varietal differences in expression of nutrient deficiencies were also apparent.

2245. TAPER, C. D., AND OTHERS.
Magnesium, calcium, and boron nutrition of the strawberry in relation to black root disease.
Canad. J. Plant Sci., 1957, **37**: 167-73, bibl. 14.

The effects of Mg, Ca and B at various levels and combinations were studied with Senator Dunlap strawberries in sand culture. With increasing Mg levels, Mg tended to accumulate and Ca tended to decrease. Higher B tended to increase B accumulation and to decrease fruit yield. At 0·5 p.p.m. B all plants showed boron toxicity and certain symptoms characteristic of strawberry black root disease.

2246. GIGANTE, R.
Un grave deperimento del pesco dovuto a clorosi ferrica ed all'azione del freddo. (**A serious dieback of peach trees due to iron chlorosis and the effects of low temperature.**) [English summary 7 lines.]
Boll. Staz. Pat. veg. Roma, 1956 (issued 1957), **14**: 89-101, illus.

Injection of ferrous sulphate into the trunks resulted in the formation of new, normal leaves. Foliar application of products containing minor elements (not specified) was ineffective. Wild seedlings in the same orchard were not chlorotic.

2247. HALL, C. B., AND DENNISON, R. A.
Lime-induced manganese deficiency of strawberries.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 228-9, bibl. 3.

On 2 fine sand soil types moderate or severe leaf chlorosis was associated with a soil pH of 6·6 or higher and a Mn content of 16 p.p.m. or less. Only slight chlorosis occurred when the soil pH was between 6 and 6·5.—Fla agric. Exp. Stat., Gainesville.

2248. GAVRILOVIĆ, M.
Nedostatak cinka kod raznih vrsta i sorata voćaka u NR Srbiji i prihranjivanje voćaka cinkom. (**Zinc deficiency in fruit trees and its correction.**) [English summary 1 p.]
Arh. poljopr. Nauke, 1956, **9**(24): 107-116, bibl. 10, illus.

During studies from 1952 to 1955 Zn deficiency was most frequently found in fruit trees grown on alluvial sandy soils in Serbia and Metohia and on chernozem in Vojvodina. The symptoms were most severe on apple and sweet cherry, less so on peach, plum and quince, and were not observed on pear, walnut, apricot, sour cherry, mulberry or filbert. Susceptible and resistant apple varieties are listed. Of plums the Italian prune was the most susceptible. Symptoms were also found on myrobalan, acacia and some ornamentals. Apple varieties on different EM rootstocks and on seedlings appeared to be equally affected. It is suggested that warm dry weather, especially in the spring, and high rates of organic fertilizers accentuated the symptoms. Affected trees responded well to dormant sprays of 3–4% zinc sulphate. Summer sprays of zinc oxide were less effective.

2249. KREUTZ, W., AND WALTER, W.
Der Wind als Träger von Zementstaub und dessen Ablagerung auf Boden und Pflanze. (**The wind as a carrier of cement dust and its deposit on soil and plants.**)
Gartenbauwiss., 1956, **3**: 151-64, illus.

The effect of cement dust deposits in the area round Heidelberg has been studied. The quality of fruit, grapes and market garden produce has been lowered, but yields have not yet been affected.

2250. PILGAARD, A.
Revner omkring blomsterpartiet hos Ingrid Marie. (**Skin cracking in the calyx region of Ingrid Marie apples.**)
Erhvervsfrugtavl., 1957, **23**: 110-12, illus.

In Denmark skin cracking in the calyx region is a widespread trouble with Ingrid Marie apples, the cause of which is as yet unknown. The author discusses replies by growers to a questionnaire sent out by the Danish Plant Pathology Service, Lyngby.

2251. NILSSON, F., AND FERNQVIST, I.
Sprickbildning hos Ingrid Marie. (**Fruit cracking in Ingrid Marie.**)
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 5-12, illus.

Fruit cracking of Ingrid Marie apples is of great economic importance in Sweden. Observations so far have shown that (1) vigorous rootstocks, such as M.XVI and seedlings, are conducive to the development of the trouble in contrast to M.IV, and (2) cracking is more marked in large and in red-coloured fruits than in small and in green fruits respectively. The work continues.

2252. MILLIKAN, D. F.
Symptoms of scar skin in apple.
Abstr. in *Phytopathology*, 1957, **47**: 25.

Scar skin, a disease first reported in 1955, was found in several orchards in Missouri during the 1956 growing season. In early June, when the apples were slightly less than ½ in. in diameter, light water-soaked blemishes appeared, radiating from the calyx end of the fruit. Two weeks later, when the apples were ¾ in. in diameter, scar tissue developed in the epidermis, especially around the calyx. By July, when the fruits were over 1 in. in diameter, irregular patches of epidermal scar tissue developed on the sides of the fruits. Later, as much as 50% of the fruit surface was affected. On the affected trees every fruit had symptoms as described. Throughout the growing season fruits from the affected trees were markedly smaller than fruits from the adjoining unaffected trees.

2253. ATKINSON, J. D., CHAMBERLAIN, E. E., AND HUNTER, J. A.
Willow leaf of plums.
Orchard. N.Z., 1957, **30**(1): 2-3, bibl. 1, illus.

Symptoms of willow leaf in New Zealand are described. It is confirmed that willow leaf is not caused by a graft transmissible virus, but that it is a result of bud mutation.

2254. HEWITT, W. B.
Some manifestations of black measles of grapevines.
From abstr. in *Phytopathology*, 1957, **47**: 16.

Observations made over 6 years showed that black measles, a vine disease of unknown origin, occurs sporadically within a vineyard and that symptoms may reappear in the same vines only at infrequent intervals. Application of sodium arsenite at 2·5 lb. per 100 gal. after dormant pruning resulted in a significant reduction in the number of vines with measles, but there was no difference in infection rate the second year after spraying. Application of the triethanolamine salt of 2-*sec*-butyl-4,6-dinitrophenol did not give effective control.

Climatic factors.

(*See also* 2014, 2230, 2341i, j, n, v, 3011.)

2255. Säkö, J.
Hedelmänviljelyä kohdanneesta tuhosta v. 1955–56. (**Losses caused by climatic conditions to fruit farming in Finland, 1955-56.**) [English summary ½ p.]
Maataloust. Aikakausk., 1957, **29**: 1-26.

A dry summer followed by a severe winter caused great loss among Finnish fruit trees. Information by means of a questionnaire concerned some 45,000 apple trees and certain data were also obtained on pears, plums and cherries. The tabulation of the data show that Kaneli and Sokeri-Miron apple varieties stood up to the conditions best and Oranie, Signe Tillisch, Linda and Wealthy worst among commonly grown varieties. Stock effect was not very noticeable, though Åkerö and Melba withstood conditions better on M.II than on M.IV or Normandie. The character of the soil and its slope had a marked influence on damage sustained. The 14 tables given are provided most effectively with English legends.

2256. Slater, C. H. W.
Frost damage research equipment at East Malling.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 93-6, bibl. 2, illus.

The construction and equipment of frost research rooms, in which plants can be subjected to controlled cycles of freezing and thawing, are described. Details are given of temperature recording apparatus, including a special potentiometer for use with thermocouples; and also of a covered shelter for experimental material, and a caravan fitted as a mobile instrument room. [Author's summary.]

2257. Proebsting, E. L., Jr., and Fogle, H. W.
An apparatus and method of analysis for studying fruit bud hardiness.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 6-14, bibl. 16, illus.

An artificial freezing apparatus in which the temperature can be lowered automatically at a pre-set, uniform rate is described. This is achieved with a cartridge-type thermostat, placed through the freezer wall into the interior storage space. The thermostat is driven by an electric clock motor drive, the operation of which is controlled by settings of a five-minute interval timer. The apparatus has the advantage of direct control of the interior temperature of the freezer, the elimination of antifreeze baths, flexibility in the rate of temperature fall, and inexpensiveness. An experimental technique for obtaining fruit bud hardiness data is described which takes advantage of the operational flexibility of the apparatus. Data are presented to show the sigmoid nature of the hardiness response curve. The temperature at which 50 per cent. of the fruit buds are killed, designated as T_{50}, was chosen as the logical way of expressing hardiness, removing the percentage kill variable and making possible direct, valid comparison of different runs of material. Its usefulness was shown with a run of Elberta peach fruit buds. [From authors' summary.]—Wash. St. Coll. and U.S.D.A. Irrig. Exp. Stat., Prosser.

2258. Gudzenko, A. A.
The temperature regime of prostrate orchards in the dry steppe zone. [Russian.]
Sad i Ogorod, 1957, No. 1, pp. 56-7.

In Northern Kazakhstan measurements taken by thermographs and hydrographs at the heights of 0·25 and 2 m. have shown that in prostrate orchards the climate near the ground is somewhat less favourable than that at a height of 2 m., but the advantages of prostrate habit outweigh this slight climatic handicap.

2259. Anjou, K.
Frysningsförsök med äpplegrenar. (**Freezing trials with apple shoots.**) [English summary 11 lines.]
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 43-50, bibl. 7.

Hardiness tests with apple shoots were carried out at Balsgård during the winters of 1952–55 with the object of studying the seasonal aspects of frost resistance. It was found that resistance to frost increases during the early winter to reach its maximum in the first part of February, and that thereafter it decreases gradually with the onset of growth in spring. A mild period occurring, for instance, in January will reduce hardiness and increase susceptibility to a drop in temperature later on. In the freezing trials the pith, the medullary rays and the cell layers between the flower bud and the spur suffered damage at relatively high temperatures, the spurs proving also very tender. In January and February the cambium and bark tolerated very low temperatures, but in the autumn and spring they were injured more easily. [Translation of Swedish summary. See also *H.A.*, 26: 349.]

2260. Scaramuzzi, F.
Alcune osservazioni sui danni arrecati al pesco dalle minime termiche dell'inverno 1955–56 in relazione all'epoca della potatura invernale. (**Observations on injuries caused to peach trees by low temperatures in the winter of 1955-56 in relation to time of winter pruning.**) [English summary ⅓ p.]
Riv. ortoflorofruttic. ital., 1957, **41**: 24-39, bibl. 26, illus.

Observations cover 3 districts of central Italy and 11 varieties of peach. Injury from frost was slightly more severe at first in trees pruned before the frost, but after fruit set there was little difference between those pruned before and after the frost. Late pruning has the advantage that it can be modified according to any winter damage that may occur.

2261. Bowen, T. J.
Chilling requirements of the peach.
Qd agric. J., 1957, **83**: 27-30, illus.

It is stated that the buds of most peach varieties will break normally in the spring if the trees have had an 8-week period with mean temperatures of below 50° F. It has been found that China Flat and Pullars Cling are less exacting than the early varieties Mayflower, High's Early Canada and Brigg's Red May. Dormancy can be broken after a mild winter if a spray of 0·03% DNCHP [dinex] is applied about 4 weeks before bud burst. J.R.L.

2262. OLDÉN, E. J.
Vinterhärdigheten hos plommon efter undersökningar utförda åren 1952–1956. **(Winter hardiness of plums according to studies 1952-1956.)** [English summary 1¼ p.]
Sver. pomol. Fören. Årsskr. 1956, 1957, pp. 89-111, bibl. 15, illus.

Shoots of 75 plum varieties were exposed to temperatures of 20–35° C. in January and of 15–30° C. in December and March. Estimated frost damage is tabulated for the period 1952–1956. Injuries caused to the trees in the orchard during the winters of 1954/55 and 1955/56 were also studied. Graphs indicate the reponse of various organs to different degrees of frost at different stages of dormancy. In December the bark proved more susceptible than the wood, but in January and March the bark was the hardier of the two tissues. One- and two-year-old shoots showed greater resistance in March than did the fruit buds and spurs, but in December one-year shoots were found to be fairly tender. In March fruit buds were severely damaged by temperatures of −20 to −25° C. Variations in the frost resistance of the same variety in different winters are attributed to conditions in the preceding growing season, especially those affecting wood maturity. Observations suggest that the time of leaf abscission is an indication of a variety's hardiness, the tender ones shedding their leaves late. [See also *H.A.*, 26: 349.] Swedish terms used in captions are translated in the English summary.—Balsgård.

2263. VARTANJAN, M. D.
The dependence of frost resistance of vine buds on cell sap concentration. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 2, pp. 37-8.

Data are given showing that vine shoots damaged at −6° C. in the spring had much lower sugar and mineral contents than undamaged shoots. Cultural methods recommended for increasing the cell sap concentration are summer pruning, late application of P and K and timely irrigation.

2264. PRESTON, A. P.
Summer gale damage to apple rootstock and pruning trials in 1956.
A.R. E. Malling Res. Stat. 1956, 1957, A40: 85-8, bibl. 5.

A gale, reaching force 8 on the Beaufort scale, occurred on 29th July, 1956, and caused considerable damage to fruit trees. This paper surveys the damage to 12-year-old apple rootstock and pruning trials in two plantations on different soils. The records of damage are discussed in relation to rootstock selection, tree shape, method of pruning and the staking of trees. [Author's summary.]

Viruses.

(*See also* 2242, 2341m, p, w, 2342b, c, f.)

2265. HILBORN, M. T., AND HYLAND, F.
Anatomical changes associated with wood pitting, a suspected virus disease of Virginia Crab apple.
From abstr. in *Phytopathology*, 1957, **47**: 16.

Wood pitting of Virginia Crab interstocks, associated with "quick decline" results from the phloem projecting into the xylem. Anatomical studies disclosed that some cambial initials become multi-nucleate, and the nuclei become distorted. Some cambial derivatives become abnormal, resulting in disorientation of xylem elements and phloem rays, degeneration of sieve tubes, and absence of sieve areas and companion cells.

2266. MILLIKAN, D. F., AND GUENGERICH, H. W.
Chemical inhibition of necrotic ring spot in plum.
From abstr. in *Phytopathology*, 1957, **47**: 25.

Rapidly growing shoots of a plum tree systematically infected with ring spot virus were treated from budbreak until early July with thiouracil at 140 p.p.m., with 8-azoguanine at 100 p.p.m., or with both in combination. Buds propagated from treated shoots developed into remarkably vigorous trees. When tested on indicator plants for ring spot virus, 2 trees each of the 12 thiouracil and 11 azoguanine treatments gave no indication of infection. None of the trees developing from the combined treatment was free from infection.

2267. NOVAKOVIĆ, V.
Radovi na rešavanju problema šarke šljive u NR Bosni i Hercegovini od 1953–1955 godine. **(Plum pox control in Bosnia and Hercegovina in 1953-1955.)** [English summary ½ p.]
Zasht. Bilja, 1956, No. 35, pp. 105-12.

As plum pox (*Prunus virus* 7) is still spreading, the production and use of plum seedlings in diseased areas is prohibited and where infection was not general diseased trees have been destroyed.

2268. VUITTENEZ, A.
Lutte préventive contre le court-noué de la vigne par la désinfection chimique du sol avant plantation. **(Preventive control of infectious degeneration of vines by chemical disinfection of the soil before planting.)**
C.R. Acad. Agric. Fr., 1957, **43**: 185-96, bibl. 17, reprinted in *Progr. agric. vitic.*, 1957, **147**: 262-5, 284-8.

Soil fumigation with DD immediately after clearance of old infected stock gave complete protection to vines planted 6 months later, and stimulated growth. A mixture containing methyl bromide was less, and carbon disulphide much less, satisfactory. All 3 products were used at 3 times the usual concentrations. Soil treatment with γ-BHC and carbon disulphide or with sodium chlorate one year before clearance gave relatively poor results with vines planted immediately after clearance. In untreated soil the infective power decreased very considerably after 6 months and was very low after 18 months of fallowing. Thus a suitable interval between clearance and treatment should make full control possible with fairly low concentrations of DD. It is noteworthy that infectious degeneration was controlled better by nematocidal than by other treatments.

2269. DE FLUITER, H. J.
Aardbeiknotshaarluis en virusverspreiding. **(Strawberry aphis and virus transmission.)**
Tijdschr. PlZiekt., 1957, **63**: 26.

In a field of Mme. Moutot plants, near Wageningen, the increase of strawberry aphid (*Pentatrichopus fragae-*

folii) populations and spread of virus were studied in 1955 and 1956. The period of greatest increase in aphids and virus transmission was from 29 July to 13 August. After 26 August the aphid population decreased markedly and no further virus transmission occurred. Viris was transmitted by both winged and wingless aphids. In 1956 the aphid population was destroyed by severe frost.

2270. KRISTENSEN, H. R., AND CHRISTENSEN, M.
Solbaer-ribbesvind (*Ribes virus 1*, *Acrogenus ribis*). **(Reversion of black currants.)** [English summary ¾ p.]
Tidsskr. Planteavl, 1957, **61**: 1-16, bibl. 28, illus.

The literature on reversion of black currants is reviewed and some results of new experiments are reported which were carried out at the Danish Plant Pathological Institute. The data show that nutrition and method of pruning affect the expression of symptoms to a certain extent, though their suppression was never achieved. Symptoms were most pronounced at low K levels. Both nutrition and pruning had a considerable influence on growth and cropping, but in no case did the yields of diseased plants approach those of healthy controls. Inspection, roguing and the selection of healthy planting material are recommended.

Bacteria.

2271. FARABEE, G. J., AND LOCKWOOD, J. L.
Inhibition of *Erwinia amylovora* by bacteria isolated from fire blight cankers.
From abstr. in *Phytopathology*, 1957, **47**: 10.

Bacteria associated with *Erwinia amylovora* in fire blight cankers on apple and pear trees were found to be non-pathogenic, and many of the isolates were inhibitory to *E. amylovora* in culture tests. The data suggested that the associated bacteria inhibited *E. amylovora* in culture by lowering the pH of the media below that favourable for growth, i.e. below 4·4. Of 9 bacteria that prevented growth of *E. amylovora* in culture, 7 inhibited fire blight development when introduced into twigs of Jonathan apple simultaneously with *E. amylovora* in media buffered at pH 6·8. Two other isolates, non-inhibitory in culture, also inhibited symptom development.

2272. HAMILTON, J. M., AND SZKOLNIK, M.
Omadine, a promising new organic fungicide for the control of blossom blight of pears.
Plant Dis. Reptr, 1957, **41**: 301-2.

Greenhouse tests on cut branches and potted pear trees for the control of blossom blight (*Erwinia amylovora*) indicate that the sodium and zinc salts of 2 pyridinethione 1-oxide provide for more effective control than do bordeaux mixture and the antibiotics streptomycin, Malucidin, and griseofulvin. [Authors' summary.]—N.Y. St. agric. Exp. Stat., Geneva.

2273. CROSSE, J. E., AND BENNETT, M.
Preliminary field trials with streptomycin for the control of bacterial canker of cherry.
Plant Path., 1957, **6**: 31-5, bibl. 8, illus.
CROSSE, J. E.
Trials with the antibiotic streptomycin for the control of bacterial canker of cherry.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 170-2.

Spring and autumn sprays of 0·02 to 0·03% streptomycin were evaluated for control of bacterial canker (*Pseudomonas mors-prunorum*) in preliminary field trials at East Malling in 1954-1956. Autumn sprays of streptomycin applied to young trees reduced the total number of branch infections on Napoleon by more than two-thirds and on Roundel by slightly more than half. Spring sprays previously applied for leaf spot control may have contributed to control of branch infections. There were indications that streptomycin was more effective against the milder types of infection than against the more severe forms. In general control with streptomycin was slightly better than that obtained with 2 autumnal sprays of bordeaux. Streptomycin applied 2 or 3 times between full bloom and 100% petal-call gave highly effective control of the leaf spot phase of the disease. The second article is a popular account of the same work.

2274. SLACK, D. A., AND HAMBLEN, M. L.
Control of current-season infection of peach by *Xanthomonas pruni* in Arkansas.
From abstr. in *Phytopathology*, 1957, **47**: 33.

In tests at Nashville over several years, sprays of 6–8–100 zinc bordeaux and of zinc oxysulphate at 4 lb. per 100 gal. gave significant protection against peach fruit infection by *Xanthomonas pruni*, but foliage infection and defoliation were not affected. In 1955 and 1956 sprays containing streptomycin partially controlled foliage infection and gave better control of fruit infection than did zinc bordeaux. Under conditions of severe bacterial spot infection at Fayetteville, however, streptomycin sprays did not give effective control.

Fungi.

(*See also* 2182y, 22401, s, 2242, 2297, 2326-2328, 2341c, e, f, h, l, x, y, 2342a, d, k, m, n, r.)

2275. CIFERRI, R., AND CORTE, A.
Tre anni di osservazioni sui rapporti tra malattie crittogamiche delle piante e irrigazioni a pioggia. **(Three years of observation on relationships between fungus diseases of plants and sprinkler irrigation.)**
Not. Mal. Piante, 1957, No. 39, pp. 51-8.

The crops observed included lettuce, beans, parsley, strawberry, tomato, marrow, tobacco, vine, almond, peach, cherry, plum and various ornamental plants. Of the 49 diseases studied 22 were enhanced, 5 reduced and 22 apparently unaffected by sprinkler irrigation as compared with ordinary watering or dependence on rainfall. Those increased included *Sclerotinia minor* on lettuce, *Phytophthora megasperma* on *Cineraria*, *Fusarium conglutinans callistephi* on asters, *Septoria petroselinii* on parsley, *Gloeosporium cyclaminis* on cyclamen, *Coniothyrium* spp. on rose, *Fulvia fulva* and *Alternaria solani* on tomato and *Taphrina deformans on* peach.

2276. KUC, J., WILLIAMS, E. B., AND SHAY, J. R.
Increase of resistance to apple scab following injection of host with phenylthiourea and D-phenylalanine.
Abstr. in *Phytopathology*, 1957, **47**: 21-2.

Organic compounds, selected for possible effects on the metabolism of the host or pathogen, were injected into potted apple trees resistant to Race 1 but susceptible to Race 2 of *Venturia inaequalis*. The compounds were fed through leaf petioles of actively growing shoots during a 24-hour period prior to inoculation. Resistance to both races was markedly increased after injection with solutions either of phenylthiourea or or DL- or D-phenylalanine. The naturally occurring L-phenylalanine was not active, suggesting that activity was due to configuration. Isomers of phenylalanine were not inhibitory to the growth of the pathogen in culture at concentrations equal to or greater than those used *in vivo*. D-Phenylalanine can function to increase resistance either by serving directly as a precursor for a compound associated with resistance or by affecting the metabolism of the leaf tissue so as to induce a resistant environment. In the latter case, the compound itself would not be changed into an inhibitor, but its action on other compounds and/or enzyme systems could result in increased resistance.

2277. SWALES, J. E., AND WILLIAMS, K.
Further note on surfactants in concentrate mixture for control of apple scab.
Canad. J. Plant Sci., 1957, **37**: 82-3, bibl. 1.

Lime sulphur in 4 pre-cover sprays, or ferbam and wettable sulphur in the first two cover sprays and ziram in the third, were applied with and without Triton B-1956, the volumes being 50 and 75 gal. per acre. The higher volume was apparently the more effective, but 50 gal. with the surfactant was equal in action to 75 gal. without it. [See also *H.A.*, 26: 2599.]

2278. HAMILTON, J. M., AND SZKOLNIK, M.
Performance of Omadine, AC5223, and other promising fungicides in the control of apple scab and cedar-apple rust.
Plant Dis. Reptr, 1957, **41**: 293-300, bibl. 1.

The performance status of new organic fungicides evaluated at Geneva for the control of apple scab (*Venturia inaequalis*) and cedar-apple rust (*Gymnosporangium juniperi-virginianae*) is reported. Data are presented to help categorize the new materials according to their relative merits in controlling scab either through retention and protection or through eradication. From the great number of potential new fungicides so evaluated emerge the Omadines, AC5223, several Puratized compounds, Thioneb, and Thylate as the fungicides with the most interesting possibilities. The iron salt of Omadine was more effective against apple scab and rust than were the other Omadine salts. The AC5223 was selected as the most promising scab fungicide among the 15 or so guanidine base fungicides evaluated. The Puratized compounds, which are largely carbamates, and the thiuram fungicides Thioneb and Thylate have variable eradicative activity against scab. The specificity of Thioneb against the cedar-apple rust fungus is fairly pronounced although it is probably not equivalent to that of ferbam. Unfortunately, none of the new organic fungicides discussed here shows any promise in the control of powdery mildew (*Podosphaera leucotricha*). [Authors' summary.]—N.Y. St. agric. Exp. Stat., Geneva.

2279. SEWELL, G. W. F.
Collar rot of apple trees.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 168-9, illus.

Symptoms of collar rot, *Phytophthora cactorum*, are described. The disease is widespread in England, but so far the only variety seriously affected is Cox's Orange Pippin. Worcester Pearmain is highly resistant, but several other commercial varieties are susceptible. Tests have shown that the rootstocks M.II and M.IX are resistant, whereas M.XII, M.XIII and M.XVI appear to be susceptible. Preventive and curative measures are suggested.

2280. SPRAGUE, R.
Fungi isolated from roots and crowns of pear trees.
Plant Dis. Reptr, 1957, **6**: 74-6.

Pear "decline" in north central Washington has been studied, and isolates from trees showing varying degrees of vigour are tabulated. In pathogenicity tests, necrosis was induced by holding year-old trees in drowned soil for 3 days. Crown gall may also be a factor in the decline of some pear orchards.—Tree Fruit Exp. Stat., Wenatchee, Wash.

2281. NEWHOOK, F. J.
A *Pythium* disease of pear trees.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 533-8, bibl. 2, illus.

A species of *Pythium* pathogenic to pears is described. This fungus attacks the phloem of trunks, leaders, and occasionally small branches. Affected parts of trees fail to make new shoot growth and shed leaves prematurely. Fruits remain small and hard. Affected limbs die, often being attacked secondarily by *Diaporthe perniciosa*, *Stereum purpureum*, and *Coriolus versicolor*; within 3 to 10 years the tree dies. Most varieties of pear are affected. The fungus has also been isolated twice from apple trees. Orchard incidence may be as high as 20% although the disease is only serious as yet in the Te Kauwhata district. Suggested control measures are avoidance of root wounding and removal of badly affected leaders or trees. It might be beneficial to treat the soil of infected sites before replanting unless trees other than pears or apples are used. [Author's summary.]—Plant Dis. Div., D.S.I.R., Auckland.

2282. CASTELLANI, E., AND MATTA, A.
Rilievi sull'impiego di carte impregnate con un sale quaternario d'ammonio per la protezione dei frutti contro i marciumi. **(Observations on the use of wraps impregnated with quaternary ammonium salts for protection of fruit against rots.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 120-2, bibl. 6.

Fruit wrapping papers impregnated with cequartyl were compared *in vitro* with those impregnated with sodium orthophenyl phenate. The former completely failed to control banana rot and apple rot fungi, including *Didymella voglinoi*, *Gloeosporium musarum*, *Monilia fructigena*, *Phomopsis mali*, *Stachylidium theobromae* and *Trichothecium roseum*. The latter gave complete control.

2283. BERAHA, L., AND OTHERS.
Gamma radiation for possible control of postharvest diseases of apples, strawberries, grapes, and peaches.
Abstr. in *Phytopathology*, 1957, **47**: 4.

Jonathan apples inoculated with *Penicillium expansum* and incubated 24 or 96 hours prior to irradiation required a minimal gamma ray dosage of 1×10^5 rep to delay or to suppress progress of infection when held for 6 days at 70–75° F. When the fruit was stored 10 days, a minimal dosage of 2×10^5 rep was necessary Neither dosage produced visible radiation injury to apples. Gamma radiation at approximately 2×10^5 rep, either alone or in combination with refrigeration, markedly prolonged storage life of non-inoculated strawberries by delaying development of both *Rhizopus nigricans* and *Botrytis cinerea* without visible radiation damage. The growth of *B. cinerea* in grapes after inoculation, as evidenced by the appearance of rot, was inversely proportional to the dosage of irradiation within the range of 5×10^4 to 3×10^5 rep. At 1×10^6 rep and 5×10^5 rep no rot developed within 10 days after inoculation. Peaches inoculated with *Monilinia fructicola*, irradiated at a dosage range of 2×10^5 to 3×10^5 rep and held at room temperature for 10 days, did not become infected. Under the same conditions radiation in the range of $2{\cdot}5\times10^5$ to 3×10^5 controlled *R. nigricans* without radiation injury. Inoculations in each case produced severe infection in non-irradiated controls within 5 days.

2284. Sitterly, W. R., Williams, E. B., and Shay, J. R.
Factors influencing infection of apple fruits by *Botryosphaeria ribis*.
Abstr. in *Phytopathology*, 1957, **47**: 32.

Symptom expression on apple fruits by *Botryosphaeria ribis* varies markedly with maturity of fruits. Rotting is arrested or progresses very slowly in immature fruits but spreads rapidly as the fruits ripen. Growth tests of the organism in culture were made at the pH levels and concentrations of different organic compounds present in immature and mature fruits. Tyrosine, asparagine, starch, sucrose and fructose stimulated growth at both pH levels. Compounds that inhibited growth or were not utilized included thiamine, inositol, cellulose, lactic acid and oxalic acid at the pH level of immature fruit. Intact fruits injected through spur-leaf petioles with sucrose, fructose and tyrosine showed positive infection nearly 3 weeks earlier than did the controls. Compounds that inhibited growth or were not utilized in culture failed to protect injected fruits artificially inoculated when almost mature. Intact fruits treated with maleic hydrazide to inhibit respiration could be successfully inoculated 10 days before the controls. Immature fruits picked and then treated with ethylene to stimulate respiration became infected, following inoculation, 35 days before the controls did.

2285. Hamer, P. S., and Hunnam, D.
More results of trials with captan.
Grower, 1957, **47**: 746-7, bibl. 1.

Trials made at Kirdford in 1954–56 have shown that *Gloeosporium* rot on stored apples can be reduced by one half or two thirds by suitable summer sprays of captan [see also *H.A.*, 26: 2593]. It is recommended that 50% w.p. captan should be applied at the rate of 2 lb. per 100 gal. 3 times at intervals of 3 weeks beginning at the end of July.

2286. Graves, C. H., Jr.
Fungicidal control of bitter rot.
From abstr. in *Phytopathology*, 1957, **47**: 13-14.

Many fungicides were tested for activity against 2 isolates of *Glomerella cingulata*, one causing apple bitter rot and the other causing camellia dieback. No difference between the 2 isolates was noted in reaction to the chemicals. In field tests on apples, captan and thiram gave the best disease control and their use resulted in excellent fruit finish.

2287. Dobie, N. D., and Calvin, L. D.
Optimum plot size for fungicide testing on peach trees.
From abstr. in *Phytopathology*, 1957, **47**: 8.

In spraying trials for control of *Taphrina deformans*, multiple tree plots appeared to have no advantage over single-tree plots.

2288. Lewis, F. H., and Kirby, R. S.
Fungicides for the control of peach brown rot and leaf curl.
St. hort. Ass. Pa News, 1957, **36**: 22-3, 25-7.

Results of trials are presented showing that Phygon and captan give better control of brown rot blossom blight, *Monilinia fructicola*, than sulphur, and that Thioneb is a very promising material. In a test described leaf curl [*Taphrina deformans*] control was perfect or nearly so with a high pressure dilute spray of either bordeaux mixture 6–6–100, dinitro paste or fermate and with a concentrate spray of bordeaux 10–10–100.

2289. Szkolnik, M., and Hamilton, J. M.
Control of peach leaf curl with Omadine and of brown rot with Omadine and certain antibiotics.
Plant Dis. Reptr, 1957, **41**: 289-92, bibl. 1.

The iron salt of 2-pyridinethione 1-oxide (Omadine 1565) compared favorably with liquid lime sulfur, the dinitros, and ferbam in the control of peach leaf curl in both fall and spring applications. The zinc salt of Omadine (OM 1563) was at least as effective as captan for the control of brown rot on peaches when applied as a pre-harvest spray. One pre-harvest spray of OM 1563 1–100 or Captan 50W 2–100 was equivalent to three applications of Micronized sulfur 4–100 or Thioneb 1¼–100. OM 1563 1–100 was consistently superior to Micronized sulfur or captan in dip treatments. Mycostatin, fungichromin and oligomycin were equally as effective as the OM 1563 at concentrations of 100 and 200 p.p.m. [Authors' summary.]—N.Y. St. agric. Exp. Stat., Geneva.

2290. Hawthorne, P. L., and Horn, N. L.
Peach storage rot control by preharvest applications of certain fungicides.
From abstr. in *Phytopathology*, 1957, **47**: 15.

Dixigem peach trees were treated with 1 or 2 applications of the 98% sodium salt of dehydroacetic acid at 1–4 lb. per 100 gal. at various dates before harvest. At harvest the fruit was bruised and nicked with a knife, stored at 60° F. for 20 days. Inocula of *Sclerotinia fructicola*, *Aspergillus* sp. and *Penicillium* sp. were present in the store. The 1- and 2-lb. applications 10 days before harvest were the most effective treatments, reducing storage rots from 90% in the controls to 10% and 30% respectively. Applications of 0·25 and 0·5% ortho-phenylphenate gave less effective control.

2291. DIMARCO, G. R., AND DAVIS, B. H.
Prevention of decay of peaches with post-harvest treatments.
Plant Dis. Reptr, 1957, **41**: 284-8.

Several chemicals were tested in 1955 to determine their value in controlling brown rot of harvested peaches caused by *Monilinia fructicola*. The fruit was inoculated, incubated for 3 hours, and dipped in the chemicals. Mycostatin (Nystatin), a broad spectrum, antifungal antibiotic used in human therapy, and Dowicide A-M245 (sodium O-phenylphenate) gave the best results. These 2 materials were tested again in 1956 in a hydrocooler on field-run peaches. Both materials gave substantial reduction of brown rot and *Rhizopus* rot. Mycostatin gave better results than Dowicide in most of the tests [but its use on food products has not been approved].—[From authors' summary.]—N.J. agric. Exp. Stat., Rutgers Univ.

2292. HRISTOV, A.
A contribution to the study of plum red leaf spot disease, *Polystigma rubrum* (Persoon) De Candolle. III. Period of ripening of the stroma and discharge of ascospores and the possibility of control based on a warning service. [Bulgarian, with Russian summary 1 p.]
Nauč. Trud. Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1954, **2**: 149-64, bibl. 10.

Observations on plum trees during 1950–1952 have shown that a serious incidence of the disease is not necessarily followed by heavy infection the following year. The development of the stroma may be arrested by premature leaf fall or bordeaux spraying, superparasites (*Gloeosporium polystigmicolum*, *Trichothecium roseum*) and species of *Fusarium* may appear, and unfavourable weather conditions for the stroma, causing too early or too late spore discharge, may occur. To determine the best date for spraying against red leaf spot both the development of the trees and the maturation of the ascospores should be considered. [For part I see *H.A.*, 17: 121.]

2293. NIEMÖLLER, A.
Lederfäule an Erdbeeren durch *Phytophthora cactorum*. **(*Phytophthora cactorum* on strawberries.)**
Rhein. Mschr. Obstb., 1957, **45**(1): 15-16, from abstr. in *Beerenobstschrift.*, 1957, No. 6, pp. 5-6.

Leathery rot occurred on a large scale in part of the Rhine valley in 1956. Fruit and fruit stems of Deutsch Evern, Madame Moutot and Regina were infected. Control with organic fungicides was not effective.

2294. BOUBALS, B., AND OTHERS.
Essais de lutte contre l'excoriose effectués en 1956. **(Experiments on control of excoriosis carried out in 1956.)**
Progr. agric. vitic., 1957, **147**: 251-62, bibl. 1.

Neither anthracene oils nor DNC gave satisfactory control of *Phoma flaccida* on vines, but sodium arsenite at 0·5–5·0% gave complete control and prevented disease if applied to pruning wounds. There was no evidence of its toxicity to buds, whatever the date of pruning or the interval between pruning and treatment, but dry weather was preferable to wet for treatment. [For earlier work see *H.A.*, 26: 2607.]

2295. ROCHE, R.
La lutte contre le mildiou. **(Control of downy mildew.**
Terre maroc., 1957, **31**: 50-6, bibl. 6, and *Progr. agric. vitic.*, 1957, **147**: 209-12, 224-31, bibl. 6.

Experiments during two consecutive years of severe infection in Morocco showed that, at commercially recommended rates, zineb was slightly, and copperized oil emulsion or copperized zineb were markedly, less effective than 2% bordeaux mixture. Captan, apparently less protective of leaves than of fruit, was almost equivalent in the first year to zineb, judging by yield, but was less effective the following year.

2296. ŠTERENBERG, P. M.
The use of poisons against spotted necrosis of vines. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 1, pp. 30-3, bibl. 6.

In European vine varieties it is the old wood that is the most severely attacked by spotted necrosis, while in rootstock varieties it is the 1-year-old shoots. The cause of the disease is attributed to fluctuating temperatures and high humidity in the mounds covering the vines but it is thought that it might also be due to *Ceratostomella* spp. In control experiments cuttings of Riparia × Rupestris 101–14 were dipped for 1–2 min. in various fungicides and were then earthed up for the winter. About 4 months later it was found that of 13 materials tested 1% selinon (dinitroorthocresol), 3% Paris green, 5% copper sulphate, 20% iron sulphate and 2% preparation 125 gave the best control of spotted necrosis, and they also reduced grey mould [*Botrytis cinerea*] incidence. Spraying of established bushes before covering was also tried, but owing to low disease incidence the effectiveness of the fungicides could not be demonstrated.

Mites.

(*See also* 2318, 2327, 2339, 2341o.)

2297. AUSTIN, M. D., AND LINKE, W.
Pest control trials.
Comm. Gr, 1957, No. 3190, pp. 393-5.

Field experiments, continuing those previously reported [*H.A.*, 26: 1629], were carried out in 1956 in commercial orchards. A single application of Metasystox in May considerably reduced red spider mite populations on plum and apple. Bryobia mite was completely controlled on pears by a pre-blossom spray of Metasystox. Observations also showed that Metasystox had a considerable controlling effect on woolly aphid. Metasystox sprays applied to mealy aphids on brussels sprouts gave an initial kill of 100% but after a fortnight control was only partial. In trials with Dipterex 50 successful control of apple sawfly was obtained on Cox and Worcester Pearmain. A new formulation of TMTDS, namely Pomarsol forte, gave good scab control at relatively low rates, and was safe even on sulphur-shy varieties.

2298. Parent, B., and others.
Influence de certains fongicides sur les principaux acariens des vergers du Québec. **(The effect of certain fungicides on the important orchard mites of Quebec.)**
37th Rep. Que. Soc. Prot. Plants 1955, 1956, pp. 101-10, bibl. 7.

The effects of Magnetic 70, Mulsoid (both S sprays), ferbam and glyodine were studied on fruit tree spider mites, two-spotted mites and typhlodromid mites. In general the S sprays were toxic to the 2-spotted and typhlodromid mites. Glyodine had little effect on *Typhlodromus* spp., but reduced populations of fruit tree red spider. Ferbam did not affect mite populations.

2299. Kremer, F.-W.
Studies on the biology, epidemiology and control of *Bryobia praetiosa* Koch.
Höfchen Briefe (*English edition*), 1956, **9**: 189-252, bibl. 65, illus.

Of 8 acaricides tested against winter eggs of *Bryobia praetiosa*, only DNOC was highly effective, and as this is known to give only slight control of winter eggs of *Paratetranychus pilosus* it is not suitable for use against both pests simultaneously. Of 9 preparations tested against the summer eggs, only No. 4551 [composition not stated] gave satisfactory control. Several of the tested insecticides, including No. 4551, Systox and Metasystox, killed all the post-embryonic stages of *B. praetiosa*. For best control, therefore, it is recommended that spraying should be carried out in spring when the population consists only of post-embryonic stages.

2300. Ciampolini, M.
Importanza degli oli bianchi nella lotta contro le uova ibernanti di *Metatetranychus ulmi* Koch. **(Importance of white oils for controlling *Metatetranychus ulmi*.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 66-71, bibl. 1.

In experiments in infested apple orchards red spider mites were controlled by 1·3% and 2% white oil sprays, alone or mixed with 0·05% parathion. The treatment was most effective when applied at bud burst to pome-fruit trees and at pink bud stage to stone-fruit trees.

2301. Günthart, E.
Neues über Auftreten und Bekämpfung der Spinnmilben an Reben. **(New data on the occurrence and control of mites on vines.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 231-6, illus.

Copper sprays applied for mildew control did not appear to affect *Typhlodromus* populations. Spring spraying with phosphoric acid ester compounds was frequently followed by a late summer building-up of *Metatetranychus ulmi* and *Eotetranychus carpini*. Control of this build-up was obtained by adding Aralo or Alaxon to the spray.—Biol. Lab., Dr. R. Maag AG, Dielsdorf-Zürich.

2302. Petrosjan, F. G., and Marutjan, S. N.
New preparations against spider mites on vine. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 2, pp. 44-6.

In experiments in Armenia between 1951 and 1955 repeated applications of 0·5% pyrophos, 0·5% octamethyl or 0·2% mercaptophos (systemic action) gave the best control of spider mites on vines. A table is given showing that 3 varieties treated with octamethyl produced 22·5–51·6% higher yields of better quality fruit than the controls.

Insect pests.

(*See also* 2242, 2269, 2297, 2327, 2339, 2340, 2341b d, k, u, 2342g, j, s, 2691, 2996.)

2303. Liebster, G.
Versuche zur Bekämpfung von Blattläusen an Obstunterlagen mit systemischen Insektiziden. **(Studies on the control of leaf aphids on fruit rootstocks with systemic insecticides.)**
Dtsch. Baumsch., 1957, **9**: 57-62, bibl. 3, illus.

Ceresan, Metasystox and Primin were applied at varying strengths and combinations to apple, pear, cherry and plum rootstocks. Metasystox at all concentrations tested appeared to have the most satisfactory effect in a year of light infestation.—Inst. Obstb., Tech. Hochsch. München-Weihenstephan.

2304. Vanwetswinkel, G.
De winterbespuiting in de fruitteelt. **(Winter spraying in fruit growing.)**
Cult. Hand., 1957, **23**: 94-7, illus.

In Belgium apple blossom weevil is controlled by sprays of DNOC with or without DDT. Tests have shown that the combination spray did not give better results than DNOC alone. In tests on residual effects, DNOC, DNOC+DDT and E605 still gave 100% control 14 days after application. DNOC acted best on dry wood, while E605 was more effective in damp weather.—Opzoek. Stat., Gorsem.

2305. Briggs, J. B.
Some experiments on control of ground beetle damage to strawberry.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 142-5, bibl. 6, illus.

A brief account is given of the life history and some features of the biology of ground beetles damaging the ripe and ripening fruits of strawberry. The most important species concerned at East Malling are *Harpalus rufipes* (Deg.) and *Feronia melanaria* (Ill.). Two distinct types of damage, caused by these and other species, are described. The adults are very active and may invade the strawberry bed only shortly before the crop is ripe. Suggestions for cultural methods of control are outlined. An experiment is described in which a 0·2% dieldrin emulsifiable liquid successfully controlled the damage, but this and other work showed that an undesirably high residue of dieldrin was present on the picked fruit, when applied at the time and in the manner described. [Author's summary.]

2306. Madsen, H. F., and Sanborn, R. R.
Peach tree borer control tests.
Calif. Agric., 1957, **11**(2): 3, 15.

A young apricot orchard, which was heavily infested with the peach tree borer [*Sanninoidea exitiosa*], was used for soil fumigant trials in 1955–56. Propylene dichloride and tetrachloroethane gave control as good as, or better than, the standard paradichlorobenzene; ethylene dichloride was less effective, owing possibly to faulty formulation. In tests on young almond trees tetrachloroethane proved highly phytotoxic, but none of the other materials was injurious. Tests with trunk sprays are in progress.

2307. Stanković, A., and Dokmanović, S.
Prilog proučavanju suzbijanja grčica na peščanim terenima Severne Bačke. **(Cockchafer grub control on the sandy soils of North Backa.)** [English summary ¾ p.]
Zasht. Bilja, 1956, No. 36, pp. 53-8, bibl. 12.

Grubs, particularly those of the marble cockchafer, *Polyphylla fullo*, cause serious damage in young vineyards of the region. In control trials in 1955 γ-BHC at from 75 to 260 mg. and technical BHC at from 1,000 to 3,000 mg. were applied to each planting hole. The γ-BHC at 140 mg. gave complete control of the grubs without injuring the young vines. Higher rates of this material and all rates of technical BHC were found to be phytotoxic.

2308. Thurston, R., Starks, K. J., and Boush, G. M.
Control of green June beetle adults with insecticides.
J. econ. Ent., 1956, **49**: 828-30, bibl. 2.

In laboratory tests lindane, heptachlor, aldrin and endrin were found to be the most toxic of 18 materials, giving 85% or better kill of green June beetle, *Cotinis nitida*, adults 24 hours after treatment. In a field test on a vineyard heavily infested with beetles, lindane at 0·125 and 0·25 lb./100 gal. gave excellent control and heptachlor at 0·5 lb./100 gal. gave good control. Heptachlor at 0·25 lb. and aldrin at 0·25 and 0·5 lb. gave poor results. Residue analyses of the sprayed grapes indicated that heptachlor and aldrin would not leave harmful deposits, less than 1 p.p.m. of either insecticide being found 1 day after treatment.—Ky agric. Exp. Stat.

2309. Maheswariah, B. M., and Puttarudriah, M.
Some observations on the life-history and habits of *Anoplocnemis phasiana* Fabricius.
Mysore agric. J., 1956, **31**: 248-55, bibl. 11, illus.

This bug has done serious damage to grape vines and eggplants in the Bangalore District. Its different stages are described, and mention is made of satisfactory control with several BHC formulations. Collecting the bugs by hand has also proved practicable.

2310. Paradis, R. O.
La lutte contre le charançon de la prune, *Conotrachelus nenuphar* (Hbst.), parasite du pommier dans le sud-ouest du Québec. **(Control of plum curculio, *Conotrachelus nenuphar*, a pest of apples in southwestern Québec.)** [English summary ½ p.]
37th Rep. Que. Soc. Prot. Plants 1955, 1956, pp. 88-100, bibl. 28.

During the most recent outbreak of plum curculio infestation in southwestern Quebec, excellent control was obtained by dieldrin, parathion and perthane. Parathion is not recommended for control because of its high mammalian toxicity and possible phytotoxicity. Perthane has not yet been sufficiently tested.

2311. EPPO.
Ceratitis capitata* Wied. *Report of the second international conference on Mediterranean Fruit Fly [in French and English]
Paris, 1957, pp. 67, bibl. 145.

The report of the actual Conference in general terms deals in turn with chemical control, physical control, residues after treatment, phytosanitary restrictions, tolerances, cultural control and biological control. This covers 13 pages and is followed by an appendix of 47 pages devoted to a report by P. Frézal of the Algerian Plant Protection Service, entitled Control of Mediterranean Fruit Fly and compiled from information obtained during visits to Southern France, Portugal, Italy, Greece, Spain, Tunisia, Morocco, Libya and Israel in 1954 and 1955.

2312. Hamilton, D. W.
Resistance of the codling moth to DDT sprays.
J. econ. Ent., 1956, **49**: 866-7, bibl. 3.

In laboratory experiments with 16 strains of codling moth of different geographical origin some strains showed resistance to DDT. Data obtained from one apple orchard show that in 1943 the use of DDT beginning with the seventh cover spray completely stopped codling moth entries, but in 1950 worm holes averaged 0·3 per 100 apples after 7 applications and in 1954 71·1 after 9 applications.—Ent. Res. Branch, Agric. Res. Serv., U.S. Dep. Agric., Vincennes, Ind.

2313. Stephens, J. M.
Spore coverage and persistence of *Bacillus cereus* Frankland and Frankland sprayed on apple trees against the codling moth.
Canad. Ent., 1957, **89**: 94-6, bibl. 3.

In field trials an average spray coverage of $2{\cdot}7 \times 10^4$ spores of *Bacillus cereus* per sq. mm. failed to infect a sufficient percentage of codling moth larvae to give fruit protection. Application of higher spore concentrations are economically impracticable.—Ent. Lab., Belleville, Ont.

2314. Schmidt, M.
Der Einfluss der Temperatur auf Beginn und Verlauf des Apfelwicklerfluges. **(The influence of temperature on beginning and progress of apple codling moth emergence.**
Arch. Gartenb., 1956, **4**: 277-8, bibl. 5.

Emergence of the first apple codling moth generation may be expected when relatively warm, rainy days with little wind and a mean temperature of about 15° C. occur on or soon after reaching a temperature sum of 283° C. over 6° C. calculated from time of coltsfoot blossoming, or of 136° C. over 8° C. calculated from time of gooseberry blossoming.—Zentralinst. angew. Meteor. Halle (Saale).

2315. Bauckmann, M.
Untersuchungen über eine termingerechte Bekämpfung des Apfelwicklers (*Carpocapsa pomonella* L.) unter Berücksichtigung des Falterfluges. **(Studies on codling moth control with special reference to time of emergence.)**
Arch. Gartenb., 1956, **4**: 253-76, bibl. 43, illus.

Observations of ultra-violet light traps placed in apple orchards show that codling moth emergence is at its height on evenings following days with a mean temperature of about 18° C. Light traps other than ultra-violet proved useless for observing moths of the second generation. Spraying should be carried out 10–12 days after the principal dates of emergence. If emergence is irregular the treatment should be repeated 10–14 days later. Mist application proved superior to conventional or low-volume spraying.—Inst. Obst- u. Gemüseb. Martin-Luther-Univ. Halle-Wittenberg.

2316. Madsen, H. F., and Hoyt, S. C.
New materials for codling moth.
Calif. Agric., 1957, **11**(3): 6, 14.

Two spraying trials on pears are reported. In the first diazinon, diazinon+DDT and Trithion were less effective against codling moth than parathion+DDT. Trithion had the advantage of suppressing European red mites [*Metatetranychus ulmi*] throughout the rest of the season, but it caused some fruit russeting. In the second trial the 2 outstanding materials were Guthion, and Carbon and Carbide 7744. Other materials giving fair control were DDT (at 2 lb. but not 1 lb. 50% w.p./100 gal.), ryania and Hercules 528.

2317. EPPO.
Hyphantria cunea **Drury.** ***Report of the fourth international conference on fall webworm*** [in French and English], Belgrade and Zagreb, 1956, Paris, 1957, pp. 35, illus.

The Conference outlined effective measures of control and laid down certain phytosanitary measures as being desirable to prevent the spread of the fall webworm. Appendix A contains information on incidence and control in different countries, B on the biology of the insect and C on its biological control.

2318. Asquith, D.
Some results on the control of the red-banded leaf roller and the two-spotted mite.
St. hort. Ass. Pa News, 1957, **36**: 39, 41-5.

Four DDT combinations and Guthion were tested with each of the fungicides captan, glyodin and ferbam on 5 apple varieties. The results show that DDT plus TDE gave the best control of red-banded leaf roller, *Argyrotaenia velutinana*, and Guthion of spider mite. It was found that captan tends to cause the least cracking of Stayman apples, and with 4 varieties gave the highest yields.

2319. Guillemenet, R., and Roche, R.
Le sphinx de la vigne (*Colerio livornica* Esp.) dans la province des Chaouïa en 1956. **(The vine hawk moth (*Celerio livornica*) in Chaouïa province [Morocco] in 1956.)**
Terre maroc, 1957, **31**: 42-6, illus.

The biology of the pest is described. Other host plants are sorrel (*Rumex* spp.), *Polygonum* spp., *Linaria* spp. and *Emex spinosus*. Standard insecticidal treatments are effective against early-stage larvae, but useless against those of later instars, which can be killed by spraying with 500 l. per ha. of 1·5–2·0% lead arsenate solution. Rotenone, chlordane and parathion appear to act as repellents.

2320. Michelbacher, A. E., and Hitchcock, S. W.
Soft scales on walnut in 1956.
Calif. Agric., 1957, **11**(3): 7-8, 14, illus.

Populations of frosted scale (*Lecanium pruinosum*), European fruit lecanium (*L. corni*) and calico scale (*L. cerasorum*) reached injurious levels on walnuts in parts of northern California during 1956. In many cases this was attributable to the use of DDT on crops in adjoining fields. In control trials the best results have been obtained with parathion and malathion, although the 3 scale species differed in their sensitivity. All 3 species can also be satisfactorily controlled in the winter by spraying with a 3% dormant oil emulsion.

Nematodes.

(*See also* 2342q, 3022.)

2321. Nolte, H.-W., and Dieter, A.
Nematoden an Baumschulgewächsen in Mitteldeutschland. **(Nematodes on nursery trees in central Germany.)**
Nematologica, 1957, **2**: 63-7, bibl. 7, illus.

A survey of a large number of fruit and ornamental tree nurseries in central Germany showed that in many cases soil sickness was associated with the presence of nematodes, especially Tylenchidae and Dorylaimidae. Tables show the relative numbers of nematodes associated with healthy and sick plants of *Robinia pseudacacia*, *Caragana arborescens*, *Prunus padus*, *Laburnum anagyroides*, *Sambucus rubra*, *Rosa pollmariana*, *Syringa vulgaris*, *Larix*, *Pinus* and *Picea*.—Biol. Zentralanst. dtsch. Akad. Landw. Berlin.

2322. Bosher, J. E., and Newton, W.
Pratylenchus penetrans **in clonal apple stocks.**
From abstr. in *Phytopathology*, 1957, **47**: 4.

Layering was found to favour dissemination of *Pratylenchus penetrans* in roots of apple stocks. Conspicuous root injury and reduced growth in 2-year-old stocks were associated with populations of *Pratylenchus* exceeding 80 per g. of roots. Soil fumigation by injection of Nemagon at rates of 10–40 gal. per acre in the root zone of 2-year-old apple stocks, during the dormant period in early November or during active growth in June, significantly reduced total nematode populations but did not completely eradicate *Pratylenchus*. Application at 40 gal. per acre during the dormant season caused only slight yellowing of the foliage, but 15 or 20 gal. per acre applied during active growth caused severe yellowing of the foliage and reduced plant growth. [See also *H.A.*, 27: 1311.]

Other pests.

(*See also* 2169, 2342h, t, 2680, 3022.)

2323. Porritt, S. W.
Gas fumes kill mice.
Amer. Fruit Gr, 1956, **76**(11): 27, illus.

In British Columbia carbon monoxide from tractor exhaust was piped into sealed fruit stores for control of mice infestation. Meadow mice were killed within 3 hours by exposure to 0·07% CO at 32° F. After ventilation there was no trace of exhaust fumes in the air or on the fruit.

2324. Winter, J. D.
An effective new rabbit repellent.
Minn. Hort., 1957, **85**(1): 5, illus.

The active ingredient of a successful new rabbit repellent is a trinitrobenzene-aniline complex. Fruit and ornamental trees and plants which have been protected by it are listed.

Fungicides.

(*See also* 2127, 2291, 2341a, 2342d, 3013, 3022.)

2325. Llewelyn, F. W. M.
Measurements of experimentally induced copper damage in apple leaves.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 109-13, bibl. 1.

A quantitative method of measuring the scorch experimentally induced on leaves of an apple rootstock is described. Results are presented of an investigation into the relation between the damage done and the concentration of copper sulphate solution applied to the leaves, the complex changes in the relationship throughout the season of 1955 being given in detail. [Author's summary.]

2326. Sibilia, C.
La sperimentazione con anticrittogamici acuprici in Italia. **(Tests with non-copper fungicides in Italy.)**
Boll. Staz. Pat. veg. Roma, 1956 (issued 1957), **14**: 1-11.

From a review of work on vines it is concluded that zineb is equal to bordeaux mixture and more satisfactory than other thiocarbamates, thiram or captan for control of downy mildew; that non-copper products are ineffective against powdery mildew; and that the problems of premature leaf fall and sugar content of the must need further investigation.

2327. Borzini, G., and others.
Efficacia pratica degli anticrittogamici acuprici. **(The efficacy of the non-copper fungicides.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 35-146.

This heading covers 37 short papers, most of which concern the use of zineb, captan and karathane against diseases of vines (mainly) and deciduous fruit trees. [Others are abstracted separately.] The papers indicate that on the whole their effect on vines has been equal to that of bordeaux, that, moreover, they promote vigorous growth, improve fruit set and yield and do no harm to the plant. On the other hand, they do not control powdery mildew and they do tend to increase the mite problem. Captan is found to be active against phylloxera and *Botrytis cinerea*, but until more is known its use on vines cannot be recommended owing to its bad effect on fermentation. Fruit tree diseases can also be treated successfully with the non-coppers, though they tend to increase russeting in apple and to be toxic to pear leaves.

2328. Venezia, M., and Canniello, A. R.
Prospettive ed indirizzi sull'impiego dell' Orthocide 50 nelle colture frutticole, orticole e floricole. **(Reviews and recommendations on the use of Orthocide 50 in fruit, vegetable and flower growing.)**
Not. Mal. Piante, 1957, No. 39, pp. 79-87.

The following results were obtained in various districts of Italy by spraying with Orthocide 50. Pear scab was controlled as effectively by this product at 0·25% as by 2% bordeaux mixture, with marked improvement of fruit colour and skin texture. A similar improvement occurred in tomato fruits, together with fair control of early blight and good control of late blight, leaf spot, leaf mould, fruit rot (*Phoma* sp.) and bacterial spot. Transplanted eggplants were protected from *Fusarium oxysporum* by treatment of planting holes, but this was ineffective against *Phytophthora capsici* on red pepper and rust on carnations. Full stands of *Ranunculus* and anemone were produced by treated corms, compared with 88%-90% stands from those not treated. On vines 0·3%-0·4% Orthocide 50 was very effective against downy mildew, but not against powdery mildew. It caused premature defoliation and slight delay in fermentation of the must, but wine quality was not affected. On certain table grapes it gave good protection against *Botrytis cinerea* and improved the colour and size of the fruit. The recommendations include addition of copper salts to prevent defoliation of vines. Its high cost restricts commercial use of Orthocide 50.

2329. Ciferri, R., Corte, A., and Bertossi, F.
Chimica e chimismo degli anticrittogamici acuprici. **(Chemistry and chemical effects of non-copper fungicides.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 11-31.

This heading covers 4 papers on zineb as affecting leaf spot on parsley, chlorophyll content of vine leaves, its incidental protective effect against smog when used on lettuce against *Marssonia panattoniana* and on celery against *Septoria apii*, and the persistence of its fungicidal effect in comparison with bordeaux.

2330. Cosmo, I., Ciferri, R., and others.
Effetti collaterali degli anticrittogamici acuprici. **(Incidental effects of the use of non-copper fungicides.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 147-68.

Observations made at various centres in Northern Italy on the comparative effect of zineb and bordeaux, which are described here in 5 papers, do not lead to any clear cut results as regards time or rate of vine defoliation induced or the starch content of the leaves in question. Where zineb accelerated leaf fall this would appear to have been due either to late mildew attack or to acceleration of vegetative maturity by zineb.

2331. Zuckerman, B. M.
Fungicide concentrates applied by helicopter to cranberry bogs in Massachusetts.
Plant Dis. Reptr, 1957, **41**: 278-83, bibl. 4, illus.

Ferbam and zineb applied by helicopter at concentrations of 33× and 23× to cranberry fields gave control of field and storage fruit rots comparable to that given by ground sprays at standard concentrations. The concentrate sprays did not injure the plants or flowers and the cost of application was lower.—Cranberry Exp. Stat., Univ. Mass., E. Wareham.

2332. CAMPBELL, A. H.
Present status of griseofulvin as a plant protectant.
Reprinted from *Meded. LandbHoogesch. Opzoekingsst. Gent*, 1956, **21**: 519-24, bibl. 15.

An account is given of the negligible plant and mammalian toxicity, systemic distribution, antifungal action and exceptional stability of griseofulvin. The results of one season's experimental work have shown that sprays or dusts of griseofulvin can retard club root (*Plasmodiophora brassicae*) on cabbage seedlings; significantly reduce infection by tulip fire (*Botrytis tulipae*) and *Botrytis* on lettuce; control powdery mildew [*Sphaerotheca* spp.] on strawberry, cucumber and chrysanthemum; and that they may be of use in controlling stem rot (*Alternaria dianthi*) and dieback (*Fusarium culmorum*) of carnations. Treated carnation plants showed increased vigour which could not be wholly attributed to disease control.—Glaxo Labs., Stoke Poges, Bucks. J.R.L.

2333. VERONA, O., AND GAMBOGI, P.
Intorno all'azione antimicotica della nistatina. I. Azione su Aspergilli, Penicilli e funghi fitopatogeni. **(The anti-fungal action of nystatin. I. Action on *Aspergillus, Penicillium* and phytopathogenic fungi.)** [English summary 10 lines.]
Ann. Sper. agrar., 1957, **11**: 193-209, bibl. 9, illus.

Nystatin, an antibiotic, was very active *in vitro* against *Endothia parasitica*, *Sclerotium rolfsii* and *Diplodia malorum*, but *Fusarium* spp., *Rosellinia necatrix* and *Thielaviopsis basicola* were resistant. Addition of small amounts of nystatin per c.c. of nutrient solution slightly stimulated the growth of french beans, but at higher concentrations root development was slightly checked. This inhibiting action was not evident when nystatin was applied at much higher concentrations to soil in pot experiments with other plants. Powdered nystatin mixed with talc checked the spread of moulds on gladiolus corms and of *Botrytis cinerea* on vine shoots.

2334. MEZZETTI, A.
Disinfezione dei locali e dei recipienti di conservazione delle frutta. **(Disinfection of places and receptacles for storing fruit.)**
Inf. fitopat., 1956, **6**: 318-20, illus.

Instructions for the use of trisodium phosphate, sodium carbonate, formaldehyde in various forms, sulphur dioxide, sodium or calcium hypochlorite and copper compounds.

Insecticides.

(*See also* 2342e, 2454, 3013, 3022.)

2335. JACKS, H.
Health aspect of plant therapeutants.
Bull. N.Z. Dep. Agric. **386**, 1956, pp. 24, bibl. 42, illus.

The health hazards involved in the use of many fumigants, fungicides, insecticides and seed and soil disinfectants, the symptoms of poisoning and the treatment of affected persons are described. Recommendations concerning protective clothing and the handling of materials are made, and the tolerance levels of residues on crops marketed (as legally accepted in the U.S.A.) are listed. J.R.L.

2336. TAYLOR, O. C., AND MITCHELL, A. E.
Soluble solids, total solids, sugar content and weight of the fruit of the sour cherry (*Prunus cerasus*) as affected by pesticide chemicals and time of harvest.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 124-30, bibl. 8.

The materials used were combinations of the fungicides, ferbam and mixed copper, with lead arsenate and parathion and the trees were 7-year-old Montmorency cherries. The effects are recorded.—Mich. St. Coll., East Lansing.

2337. FRÖHLICH, H., AND RÜPPOLD, H.
Zum Problem des Einsatzes der systemischen Insektizide im Gartenbau. **(On the use of systemic insecticides in horticulture.)** [Russian and English summaries 7 lines each.]
Arch. Gartenb., 1956, **4**: 379-88, bibl. 6, illus.

The action of phosphoric acid esters is reviewed with examples taken from the orchard, flower and vegetable garden. Experiments with the new East-German systemic insecticide Cebetox show that the compound [formula not stated] is not injurious to cucumber plants and that mammalian toxicity is low.—Inst. f. Gartenb. Grossbeeren.

2338. GUNTHER, F. A., BLINN, R. C., AND BARNES, M. M.
Infrared determination of *p*-chlorobenzyl *p*-chlorophenyl sulfide and its oxidation to its sulfone on pears.
J. agric. Food Chem., 1957, **5**: 198-201, bibl. 4.

A description is given of the procedures for residue determination on Bartlett pears. Chromatographic isolations permitted the quantitative establishment of a half life of 11 days for the parent sulphide and of 7 days for the direct sulphone oxidation product formed *in situ*.

2339. TEW, R. P., AND GROVES, J. R.
Some observations on the effects of formulation on the persistence of DDT and its toxicity to certain orchard insects and mites.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 152-60, bibl. 8.

Two seasons' trials have been conducted with various formulations of DDT, applied primarily for control of the codling moth, *Ernarmonia pomonella* (L.) on apple. Large tree to tree variations (1953) and a low incidence (1954) of this pest prevented assessment of the relative merits of the various formulations. The increases in phytophagous mite populations [especially of *Metatetranychus ulmi*], which occurred in these trials, have been shown, by the use of formulation controls, to be due to the DDT applied. The results suggest a mechanism other than removal of control by predatory insects, which were not abundant, or mites, which may be unimportant. The higher levels reached on trees sprayed with DDT emulsions compared with those on trees sprayed with suspensions were probably reflections of the greater persistence of DDT deposited from emulsions than from suspensions as shown by periodic chemical analysis of residues and by laboratory bioassay using tortricid larvae. Pronounced contact toxicity of DDT to [predacious] typhlodromid mites was observed; smaller numbers of this mite were present in late summer on trees sprayed with emulsions than on trees sprayed with suspensions. This may also reflect the differences in residue levels. DDT dissolved in diacetone alcohol with surfactants and subsequently poured into water to form a suspension of fine crystals behaved more like the emulsion used than like the other particulate suspensions. [Authors' summary.]

2340. Koroleva, N. I., and Čurakov, A. M.
Aerosol method of pest control. [Russian.]
Sad i Ogorod, 1957, No. 1, pp. 61-4, illus.

In preliminary experiments in the Tambovsk region promising results were obtained with aerosol applications of 40% extract (phenol-treated distillate of oils) +60% diesel oil against fruit tree red spider mite on apples, and of 8% DDT+92% diesel oil against green apple aphid and mealy plum aphid.

Noted.

2341.

a Abbott, D. C., and Johnson, E. I.
The determination of traces of mercury in apples.
Analyst, 1957, **82**: 206-8, bibl. 4.
A method giving 90–95% recovery.

b Andison, H.
Common strawberry insects and their control.
Publ. Canada Dep. Agric. **990**, 1956, pp. 21, illus.
Includes identification key and notes on control in all cases.

c Anon.
Le *Monilia* de l'abricotier. **(*Monilia* infection of apricots.)**
Progr. agric. vitic., 1957, **147**: 183-5.
Brief notes on symptoms and fungicidal treatments.

d Antongiovanni, E.
Lotta contro l'*Anarsia* del pesco. **(Control of the peach twig borer.)**
Inf. fitopat., 1956, **6**: 324-5, illus.
Control of *Anarsia lineatella* with 0·3% Oleofos 20 or Carposan 20.

e Austin, M. D.
Storage rots in apples.
Agric. Rev. Lond., 1957, **3**: 20-2, bibl. 2.
Factors affecting incidence of *Gloeosporium perennans* and means of control.

f Birchfield, W., and Weber, G. F.
Blight fungus invades chestnut from killed twigs.
Plant Dis. Reptr, 1957, **41**: 359-61, bibl. 8, illus.
Mode of infection by *Endothia parasitica*.

g Blanchet, R.
Répercussions de la carence magnésienne sur la physiologie et la production du pommier. **(The effect of magnesium deficiency on the physiology and production of the apple tree.)**
Rev. hort. Paris, 1957, **129**: 1606-9, bibl. 4, illus.

h Bolay, A.
Verslag van een proef ter bestrijding van appelschurft. **(Report of an experiment on apple scab control.)**
Tijdschr. PlZiekt., 1957, **63**: 23-4.
Captan applied to Belle de Boskoop in the Lausanne region successful.

i Bologov, B. V.
How to restore frost damaged fruit trees. [Russian.]
Sad i Ogorod, 1957, No. 2, p. 58.
By grafting scions from healthy, frost resistant apples on to crowns of frost damaged trees.

j Branzanti, E. C.
Ricostituzione del pesco. **(Regeneration of peach trees.)**
Inf. fitopat., 1957, **7**: 43-5, illus.
Pruning young and mature peach trees damaged by frost.

k Briggs, J. B.
Some features of the biology of the winter moth (*Operophtera brumata* (L.)) on top fruits.
J. hort. Sci., 1957, **32**: 108-25, bibl. 26, illus.
With a short discussion on economic importance and control.

l C., R., Bertossi, F., and B., F.
Note di biometria applicata alla fitoiatria. **(Biometrics applied to the cure of plant diseases.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 170-211.
Six papers on statistical methods applicable to phytopathological studies.

m Callahan, K. L., and Moore, J. D.
***Prunus* host range of elm mosaic virus.**
From abstr. in *Phytopathology*, 1957, **47**: 5.

n Capucci, C.
Possono portare germogli fertili i polloni pedali delle viti danneggiate dal freddo? **(Can basal shoots of vines damaged by cold provide fertile buds?)**
Frutticoltura, 1957, **9**: 132-4, bibl. 3, illus.
In certain varieties such as Sangiovese and Maligia.

o Chant, D. A.
Predacious spiders and mites on fruit trees.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 175-8, illus.
Notes on their habits and probable value as predators of pests.

p DIENER, T. O., AND WEAVER, M. L.
On the significance of proline and pipecolic acid accumulation in western-X diseases peach leaves.
From abstr. in *Phytopathology*, 1957, **47**: 8.

q DIETER, A.
Der gegenwärtige Stand der Erkenntnisse über die Baumschulmüdigkeit. (**The present status of knowledge on soil sickness in nurseries.**)
Dtsch. Gartenb., 1957, **4**: 45-7, bibl. 20, illus.
Causes and control reviewed.

r FEIS, N.
De vorm en de doordringing van luchtstromen in verband met de meest gewenste mondvorm bij automatische nevelspuiten. (**The form and penetrability of air streams in relation to the most desirable spray aperture with automatic low volume spraying.**)
Landbouwk. Tijdschr., 1957, **69**: 295-7.

s FEIS, N.
De meest economische uitstroomsnelheid en luchthoeveelheid bij boomgaardnevelspuiten. (**The most economic speed of flow and quantity of air in low volume orchard spraying.**)
Landbouwk. Tijdschr., 1957, **69**: 293-4.

t GAMMON, N., JR., AND SHARPE, R. H.
Mouse ear—a manganese deficiency in pecans.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 195-200, bibl. 12, illus.
Symptoms described.—Univ. Fla, Gainesville.

u GEORGALA, M. B.
A contribution to the biology of the pear sucker, *Psylla pyricola* Föer.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 135-41, bibl. 4, illus.
Studies aimed at finding the best times to spray.

v (GOIDÀNICH, G., CASARINI, B., AND FOSCHI, S.)
Ricostituzione della vite. (**Regeneration of frost damaged vines.**)
Inf. fitopat., 1957, **7**: 37-41, illus.
Damage and pruning discussed.

w GUALACCINI, F.
Una virosi del pero. (**A virus disease of pears.**) [English summary 6 lines.]
Boll. Staz. Pat. veg. Roma, 1956 (issued 1957), **14**: 121-8, bibl. 2, illus.
Symptoms of a mosaic-type disease on Passe Crassane.

x HEY, G. L.
***Gloeosporium* research: what we want to know.**
Grower, 1957, **47**: 610-12, bibl. 3, illus.
Sixteen life-history and 7 control problems.

y HICKEY, K. D., AND LEWIS, F. H.
A report on sooty blotch and fly speck of apple.
St. hort. Ass. Pa News, 1957, **36**: 37-8.
Controlled by fortnightly spray applications of captan and zineb.

z HOCHAPFEL, H.
Über das Auftreten von Zinkmangel in Apfelbuschanlagen. (**The incidence of zinc deficiency in bush apple trees.**)
Bad. Obst-Gartenb., 1956, Heft 7, pp. 167-8, illus.
A review of foreign work with which incidence in Germany appears to agree.

2342.

a TEN HOUTEN, J. G.
Hoe staat het met de vatbaarheid van appelrassen voor stambasisrot? (**The susceptibility of apple varieties to collar rot.**)
Fruitteelt, 1957, **47**: 155-8, bibl. in text, illus.
Results from inoculation tests with *Phytophthora cactorum.*

b KENKNIGHT, G.
Translocation of peach rosette virus.
From abstr. in *Phytopathology*, 1957, **47**: 20.
More rapidly downwards than upwards, but not past bark rings.

c KENKNIGHT, G.
Translocation of phony peach virus.
From abstr. in *Phytopathology*, 1957, **47**: 20.
More rapidly upwards than downwards, but not past bark rings.

d KIRBY, A. H. M., AND FRICK, E. L.
Glass-slide spore-germination tests with some oxidation products of nabam.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 146-51, bibl. 12.
Tested against *Venturia inaequalis* and *Botrytis cinerea.*

e LEIDERMAN, L.
Malathion, promissor inseticida orgânico fosforado. (**Malathion, a promising organic phosphorus insecticide.**)
Biológico, 1956, **22**: 194-8, bibl. 14.
A review, discussing toxicity, compatibility, uses and residues.

f MARKHAM, R.
Plant virus diseases and their identification.
Endeavour, 1957, **16**: 99-106, bibl. 5, illus.
Leaf malformation and colour breaking in flowers.

g MASSEE, A. M.
Hemiptera-heteroptera associated with fruits and hops.
J. Soc. Brit. Ent., 1956, **5**: 179-86, bibl. 19.
Incidence of pests and predators in Great Britain.

h MAYER, K.
Die Schneckenbekämpfung mit Metaldehydpräparaten. (**Slug and snail control with metaldehyde preparations.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 36-41, bibl. 30.
The effectiveness of metaldehyde formulations reviewed.

i (MEYNHARDT, J. T.)
Does spray irrigation cause berry cracking in grapes?
Fmg S. Afr., 1957, **32**(12): 6-9, illus.
Yes, but varieties differ in susceptibility.

j MICHELBACHER, A. E., AND HITCHCOCK, S. W.
Codling moth infestations up.
Calif. Agric., 1957, **11**(2): 7.
Controlled on walnuts with DDT, lead arsenate and ryania.

k MILLER, P. M., AND WAGGONER, P. E.
Dispersal of spores of *Botrytis cinerea* among strawberries.
From abstr. in *Phytopathology*, 1957, **47**: 24-5.
Emphasizing importance of microclimate.

l MOORE, M. H.
Concentrate spraying.
Agriculture, London., 1957, **63**: 579-82, illus.
Advantages and limitations discussed.

m MOORE, M. H.
Research and the problem of apple scab control.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 161-7.
A review for fruit growers.

n OORT, A. J. P.
Gloeosporium-aantasting in de boomgaard. (***Gloeosporium* infection in the orchard.**)
Fruitteelt, 1957, **47**: 118-21, illus.
Cutting out dead wood aids control.

o PASSECKER, F.
Chlorose und andere Kalküberschusskrankheiten bei Obst. (**Chlorosis and other disorders induced by excess calcium in fruit trees.**) [English, French and Spanish summaries 7 or 9 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 59-68, bibl. 16.

p SADASIVAN, T. S.
Uptake of ions and metal chelation in plants.
Proc. Indian Acad. Sci. Sect. B, 1957, **45**: 1-8, bibl. 51.
A review, with special reference to host-parasite relations.

q SCHINDLER, A. F., AND BRAUN, A. J.
Pathogenicity of an ectoparasitic nematode, *Xiphinema diversicaudatum*, on strawberries.
Nematologica, 1957, **2**: 91-3, bibl. 4, illus.

r STAEHELIN, M.
La défense de nos pommiers et poiriers contre la tavelure (expériences 1955 et 1956). (**Protection of our apple and pear trees from scab; experience in 1955 and 1956.**)
Rev. romande Agric. Vitic., 1957, **13**: 19-22, illus.
Trials with fungicides in Switzerland.

s TIRELLI, M.
Metodo di lotta contro la mosca delle ciliege. (**Method of controlling cherry fruit fly.**)
Inf. fitopat., 1957, **7**: 18-19.
Rhagoletis cerasi was best controlled by heptachlor and aldrin.

t VAGT, W.
Alte und neue Methoden der Wühlmausbekämpfung in den Marschen der Niederelbe. (**Old and new methods of water rat control in the marshes of the lower Elbe.**)
Mitt. ObstVersuchsringes Jork, 1957, **12**: 14-23, bibl. 13, illus.
Endrin has been most successful in orchards.

u WHITE, N. H.
Antibiosis in plant pathology.
Aust. J. Sci., 1956, **19**: 7-9, bibl. 25.
Evidence on 3 types of antibiotic relationship reviewed.

WEEDS AND WEED CONTROL.

General.

2343. TADULINGAM, C., AND VENKATANARAYANA, G. (revised and enlarged by MUDALIAR, C. R., AND RAO, J. S.).
A handbook of some South Indian weeds.
Government Press, Madras, Serial No. 38/1954, 2nd edition 1955, 9½×6 in., pp. 488, bibl. 15, illus., Rs. 7.

Seven short chapters on such subjects as nomenclature, classification, spread and methods of control are followed by the main part of this book (pp. 69-456) in which 172 species are described, 154 being illustrated by full page line-drawings. The notes include scientific names, vernacular names in several languages, botanical descriptions, habitat, distribution, means of propagation, methods of control and in many cases economic importance, usually due to medicinal properties.

2344. COUPLAND, R. T., AND OTHERS.
Basic studies.
Res. Rep. nat. Weed Cttee (West. Sect.) Canada, 1956, Lethbridge, Alberta, pp. 127-8.

Four abstracts include reports on yellow goatsbeard (*Tragopogon dubius*), treating fencelines with soil sterilants, and the biological control of St. John's wort in British Columbia in 1956.—From *Weed Abstr.*, **6**, No. 605.

2345. LE TOURNEAU, D., AND HEGGENESS, H. G.
Germination and growth inhibitors in leafy spurge foliage and quackgrass rhizomes.
Weeds, N. York, 1957, **5**: 12-19, bibl. 8, illus.

Aqueous extracts of *Euphorbia esula* foliage and *Agropyron repens* rhizomes inhibited root growth of pea and wheat seedlings germinated in petri dishes. Higher extraction ratios inhibited coleoptile growth and germination of wheat. No adverse effects on plant growth were observed when the extracts were sprayed on the foliage of wheat, bean or tomato, or when incorporated into the soil.—From *Weed Abstr.*, **6**, No. 381.

2346. SCHOLL, R.
Weitere Untersuchungen über Veränderungen der Reaktionslage des Birnbaumes (*Pirus communis* L.) gegenüber der Mistel (*Viscum album* L.). **(Further studies on changes in the reaction of pear trees to mistletoe.)**
Phytopath. Z., 1957, **28**: 237-58, bibl. 27.

Williams, Bonne Louise and Gelbmöstler trees were used as hosts to 4 strains of mistletoe. The susceptibility of the 3 varieties to mistletoe toxins was found to vary with branch age, young green shoots and 2-year-old branches being much less susceptible than 1-year-old branches. The amount of necrosis per inoculation point was greater at the lower rate of infection than at the higher rate. All varieties reacted least to pear mistletoe and most strongly to fir mistletoe. Pear susceptibility was found to vary according to variety and time of infection, being greatest in May. A second inoculation about a month after the first resulted in general in a less strong reaction. Williams was highly sensitive to a second inoculation after one year, when infection was fairly light, but reacted only slightly to a heavy infection. Bonne Louise reacted only slightly to inoculations after an interval of a year. Mistletoe-bearing pear scions grafted on to pear trees reduced the susceptibility of the rootstock branches to mistletoe toxins. Pear trees with mistletoe-bearing scions of Williams were more susceptible to a second inoculation after a year than were control trees. Scions of Bonne Louise reduced tree susceptibility.—Eidg. tech. Hochsch., Zürich. [For earlier work see *H.A.*, 21: 2555.]

Herbicides and their application.

(*See also* 2038, 2039, 2380a, b, d, j, l, 3022.)

2347. TREVETT, M. F., AND CUNNINGHAM, C. E.
A guide for the use of chemical weed killers in 1957.
Misc. Publ. Me agric. Exp. Stat. **628**, 1957, pp. 20, illus.

General methods of application and risks involved are discussed, 16 herbicides are listed and suggestions for weed control in vegetables, small fruits, field crops and turf are made. Other information relates to the control of undesirable trees and shrubs, preparation of spray concentrates and sprayer calibration.

2348. HOWDEN, J. S.
New herbicides.
Res. Rep. nat. Weed Cttee (*West. Sect.*), *Canada, 1956*, Lethbridge, Alberta, pp. 125-6.

Brief summaries on CDAA; CDEA; CDEC; 2,4-DB; MCPB; 3,4-D; EH.3Y9 (tris-(2,4-dichlorophenoxyethyl) phosphite); Chlorazin (2-chloro-4,6-bis (diethylamino)-s-triazine); neburon; (1-chloropropyl-2), N-(3-chlorophenyl) carbamate; 2,3,6-TBA.—*Weed Abstr.*, **6**, No. 735.

2349. VOEVODIN, A. V.
The reaction of dioecious plants to 2,4-D herbicide. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **112**: 148-51, bibl. 16.

In untreated dioecious perennial plants, including hops and asparagus, no case of sex reversal occurred during 3 years, but in experimental plants sprayed with 2,4-D at 3 lb./ha in 500 l. a few instances of sex alteration in both directions were noted in some species. Dioecious plants can be divided into 3 groups according to their reaction to 2,4-D: (a) species in which the ♂ plants are killed more easily than the ♀ ones; (b) species in which ♂ and ♀ plants are killed alike; and (c) species in which the ♂ and ♀ plants are equally resistant to 2,4-D.

2350. LEMBECK, W. J., AND COLMER, A. R.
Aspects of the decomposition and utilization of maleic hydrazide by bacteria.
Weeds, N. York, 1957, **5**: 34-9, bibl. 4.

Bacteria capable of utilizing the diethanolamine salt of MH have been isolated from soil treated with the chemical and from water solutions of it. The phytotoxic properties of MH to tomatoes were lessened following bacterial growth.—Agric. Exp. Stat., La.

2351. MINSHALL, W. H.
Primary place of action and symptoms induced in plants by 3-(4-chlorophenyl)-1,1-dimethylurea.
Canad. J. Plant Sci., 1957, **37**: 157-66, bibl. 10, illus.

Symptoms induced by application of the herbicide monuron to kidney bean, tomato, spinach, maize and barley are described. The primary site of monuron action was in the shoots of plants.—Canad. Dep. Agric., Ontario.

2352. MINSHALL, W. H.
Influence of light on the effect of 3-p-(chlorophenyl)-1,1-dimethylurea on plants.
Weeds, N. York, 1957, **5**: 29-33, bibl. 3, illus.

In experiments with kidney bean plants it was found that different light intensities either before, during or after treatment with monuron affected the type of symptom and extent of injury produced. Detailed results are given and discussed in relation to mode of action and field use of monuron.—Sci. Serv. Lab., Ontario.—From *Weed Abstr.*, **6**, No. 426.

Control of aquatic plants.

2353. Freeman, J. A., and Hughes, E. C.
Aquatic weeds.
Res. Rep. nat. Weed Cttee (West. Sect.), Canada, 1956, Lethbridge, Alberta, p. 78.

Monuron, monuron+2,4-D pellets, Ureabor (borate+monuron) and diuron were applied in the spring to a drainage ditch for the control of water smartweed (*Polygonum hydropiperoides*). The best treatment was diuron at 60 lb./ac., which gave 98% control.—From *Weed Abstr.*, **6**, No. 544.

2354. De Kimpe, P.
Le contrôle de la jacinthe d'eau. **(Control of water hyacinth.)** [Flemish summary 3¼ pp.]
Bull. agric. Congo belge, 1957, **48**: 105-51, bibl. 37, illus.

Encouraging results were obtained in densely infested waterways in the Belgian Congo by spraying with 1% 2,4-D at 4 kg. of acid equivalent per ha. Slower, but equally effective action resulted when the concentration was reduced to 0·8%, 0·6% or 0·4%. So far no suitable dye has been found for mixing with 2,4-D to mark treated areas and avoid waste. Agents of biological control are unknown. The spray apparatus, mounted in motor boats, was modified for low output because of slow progress. In some cases the range was increased by attaching long rubber tubes to the nozzles.

Control of woody plants.

(*See also* 2347.)

2355. Leonard, O. A., and Harvey, W. A.
Chemical control of woody plants in California.
Bull. Calif. agric. Exp. Stat. **755**, 1956, pp. 40, bibl. 12, illus.

An account of the problem, suitable herbicides and methods of application is followed by tables showing the reaction of many species to 2,4-D and/or 2,4,5-T applied by different methods.

2356. Meadly, G. R. W.
The blackberry or bramble (*Rubus fructicosus* L.).
J. Agric. W. Aust., 1957, **6**: 101-8, illus.

An account of the eradication of this dangerously spreading plant. Mid-summer spraying with 3 to 4 lb. acid equivalent 2,4,5-T should be carried out at the time of flowering and fruit formation. The plants should then be left for about 9 months before burning down, if this is necessary to facilitate further spraying the following summer. Two or three such treatments will probably be needed.

2357. Mapother, H. R.
The use of arboricidal materials to kill (a) diseased cacao and (b) certain forest trees, in the Gold Coast.
Pestic. Abstr. News Summ., 1957, **3**: 87-92.

Diseased cacao: Sodium arsenite, sodium chlorate, high aromatic oil and esters of 2,4-D+2,4,5-T and 2,4,5-T in oil or water, applied to mature frill-girdled standing trees or stumps after felling, gave complete kill. The minimum concentration required of these materials and an estimate of cost per 100 trees are given. *Forest trees:* The results of herbicidal applications to *Ceiba pentandra* and *Cola gigantea* var. *glabrescens* (previously *C. cordifolia*), which are alternative hosts of the swollen shoot disease, are presented in tabulated form. [For an earlier report listing the materials used, see *H.A.*, 26: 1657.]

2358. Mune, T. L., and Parham, J. W.
Guava and its control in Fiji.
Agric. J. Dep. Agric. Fiji, 1956, **27**: 103-8, illus.

The guava is a declared noxious weed in Fiji. Where practicable, systematic burning is an effective and economic way of cleaning areas of small or stunted guavas, but it is not a satisfactory means of controlling large trees. Among herbicides the best results have been obtained with 2,4,5-T. Young plants, 10–12 in. high, can be killed by spraying with an ester formulation containing 3·6 lb. acid equivalent per gal. at a dilution of 1 : 160 in water. Older trees can be killed by thorough spray or brush applications of the same ester formulation diluted in diesel oil at 1 : 30. Subsequent spot spraying is necessary to destroy sucker re-growth from the roots.

Weed control in fruit crops.

(*See also* 2347, 2371.)

2359. White, G. C.
Weed control under fruit trees.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 184-5.

Suggestions are made for the application of sprays of diesel oil and tractor vaporizing oil, either separately or in mixture, for controlling weeds around the trunks of fruit trees. Treatment is best done in the spring when the weeds are 4–6 in. high, and the amount of oil needed should not exceed 200 gal. per acre of treated ground.

2360. Miller, P. M.
Poison ivy.
Amer. Fruit Gr, 1957, **77**(2): 28, illus.

A single application of amino triazole in August killed poison ivy growing beneath McIntosh apple trees. No regrowth was observed by the following June, and the spray did not affect the apple trees.—Conn. agric. Exp. Stat.

2361. Wurgler, W.
Désherbage des champs de porte-greffes de vigne. **(Weed control in plantations of vine rootstocks.)**
Rev. romande Agric. Vitic., 1957, **13**: 9-11, bibl. 9, illus.

In Swiss experiments with Monuron (CMU) and Simazine (2-chloro-4,6-bis-(ethylamino)-s-triazine), only the highest rate of Monuron used (60 g of active material per are) damaged the vine rootstocks. On light soil a single treatment in May with 40 g of Monuron gave excellent control of broad-leaf weeds until autumn. Couch grass (*Cynodon dactylon*) was resistant to both herbicides at rates safe for vines. On heavy soil neither Monuron at 60 g nor Simazine at 37·5 g active material per are checked cinquefoil, but a subsequent application of the latter product at 100 g gave complete control. Thistles and bindweed (*Convolvulus arvensis*) were considerably checked, but not completely controlled at the limiting rates for vines. There was no evidence of any effect of treatments on the ripening of wood in the rootstocks.

Weed control in ornamentals and lawns.

(*See also* 2347.)

2362. Blackett, R. D.
Keeping weeds down among the bulbs.
Grower, 1957, **47**: 615-19, illus.

Results of some weed control experiments by Monsanto Chemicals Ltd at Fulmer are given. In trials with gladiolus comparing 2 rates of PCP application with unweeded control plots, it was shown that weed populations were markedly reduced, a higher proportion of large corms was produced and flowering was earlier after treatment with PCP. Weed control by PCP in tulips was outstanding. In another trial PCP at 7 lb. per acre gave effective weed control in tulips and narcissus.

2363. Helms, C. C., Jr., Crall, J. M., and Burt, E. O.
Studies on chemical weed control in plumosus fern.
Proc. Fla St. hort. Soc., *1956*, 1957, **69**: 407-13, bibl. 2, illus.

Diuron was found to be the most satisfactory of 3 promising materials for weed control in asparagus fern. At 3 lb. per acre diuron reduced weed populations by about 90%.

2364. Kimball, M. H., Day, B., and Hemstreet, C. L.
Weed control near grass areas.
Calif. Agric., 1957, **11**(2): 13-14.

Chemical weed control in confined areas, such as flower beds, small drainage channels and pathways, is complicated by the risk of damaging adjoining lawns and trees. The effects of a number of fumigants and herbicides tested in such areas are described briefly.

2365. Breakey, W. J., and others.
Weeds in lawns.
Res. Rep. nat. Weed Cttee (*West. sect.*), *Canada*, *1956*, Lethbridge, Alberta, pp. 79-80.

Three abstracts deal with the use of neburon for the control of chickweed (*Stellaria media* and *Cerastium vulgatum*). Rates of application were from 0·5–8 lb./ac. in 6 and 100 gal. water. Three lb./ac. and above gave good weed control, but for lower rates it was generally necessary to re-treat infected areas. One abstract reports that areas with a 25% infestation treated with 2 lb./ac. neburon in July, followed by the application of a heavy rate of ammonium nitrate fertilizer in August, showed complete control of chickweed, the growth of grass and clover being encouraged by the fertilizer to form a complete cover by early October. —From *Weed Abstr.*, **6**, No. 607.

2366. Greenfield, I.
Moss control.
Park Administ., 1957, **21**: 433-6.

Some of the 30 species of moss which are common weeds in grass are described. Mercury either as a mercurized turf sand applied at 4 oz. per sq. yd., as a concentrate applied at 1 oz. per sq. yd. or as a spray made from a dispersible powder will all control the mosses, but it is recommended that the physical condition of the turf should be improved at the same time.
J.R.L.

Weed control in sugar cane.

(*See also* 2380c, i.)

2367. Rochecouste, E.
Le désherbage chimique à l'Île de Réunion.
(Chemical weed control on Réunion Island.)
Rev. agric. sucr. Maurice, 1956, **35**: 298-309, bibl. 1.

Current practices on Réunion for controlling weeds in sugar cane plantations are compared with those in Mauritius. Recommendations are made for pre-emergence and post-emergence treatments with 2,4-D sodium salt and ester, MCPA, PCP and TCA. A list of 116 weed species is appended with suggested control measures for each, including sodium chlorate in a few cases.

2368. Torres, S. C. A.
Experiências com ervicidas em culturas de cana de açúcar do Estado de São Paulo.
(Experiments with herbicides on sugar cane crops in São Paulo state.)
Rev. Agric. Piracicaba, 1957, **32**: 11-20.

Under local conditions and with late planting, 2,4-D pre-emergence treatment gave satisfactory control of weeds for 7–8 weeks. Post-emergence treatment with pentachlorophenol in oil was harmful to the crop and gave poor control of weeds. The amine of 2,4-D was more convenient for use than the sodium salt. *Cynodon dactylon* was the most resistant weed, but CMU, although slower in action than 2,4-D, controlled it satisfactorily. Other grasses, *Bidens pilosa*, *Portulaca oleracea* and *Amaranthus* sp. were successfully controlled by 2,4-D.

2369. Suárez, P., and Sánchez, L. C.
Estudio comparativo sobre la efectividad de varios herbicidas en caña de azúcar.
(Comparative study of the effectiveness of various herbicides in sugar cane.) [English summary ¼ p.]
Acta agron. Palmira, 1956, **6**: 149-58, bibl. 3.

The best pre-emergence treatment was that with 15–20 lb. per ha. of Sinox. Comparatively high rates of Santobrite (25 lb.) or CMU (4 lb. per ha.) were needed for effective control. Crag 1, 2,4-D and TCA gave poor results. For post-emergence spraying CMU at 5–7 lb. per ha. was most effective. Moderate control was achieved with 2,4-D at 5 lb. or TCA at 40 lb. per ha. but Santobrite was harmful to the crop when used at rates successful against weeds. On paths and clearings the only promising herbicide was Esteron 245 (2,4,5-T).

2370. Loustalot, A. J., Muzik, T. J., and Cruzado, H. J.
Weed control in sugar cane with CMU.
Trop. Agriculture Trin., 1957, **34**: 149-51, bibl. 4.

CMU was an efficient herbicide for controlling weeds in sugar cane. Split applications were superior to single applications at the same rate. The most economic and most effective treatment was 2 lb./acre of CMU applied three times at monthly intervals. The yield of cane or sucrose was not adversely affected by the application of CMU. [Authors' summary.]—Fed. Exp. Stat., Mayaguez, P.R.

Weed control in vegetables.

(*See also* 2347, 2396.)

2371. Freeman, J. A., and others.
[Weed control in] horticultural crops and sugar beets.
Res. Rep. nat. Weed Cttee (*West. Sect.*), *Canada, 1956*, Lethbridge, Alberta, pp. 103-22.

This section contains 29 abstracts. They deal in particular and in detail with weed control in asparagus, beans, garden beet, sugar beet, cucumbers, onions, potatoes, sweet corn, strawberries and apples and with the effect of 2,4-D spray drift on tomatoes.—From *Weed Abstr.*, **6**, No. 504.

2372. Ríos, P., Montilla, J. A., and Rincón, D. J.
Herbicidas en cultivos de papa, caña de azucar, cebolla y zanahoria. (**Herbicides in crops of potatoes, sugar cane, onions and carrots.**)
Inf. Serv. Shell Agric. Venezuela, Ser. A **5**, [1957?], pp. 45, illus.

From experiments conducted at the Cagua Experimental Station, Venezuela, recommendations are made on herbicides suitable for the 4 crops: CMU, 2,4-D and a mixture of 2,4-D with TCA for sugar cane, aromatic oils, alone or fortified with PCP, for carrots, and chloro-IPC, CMU and potassium cyanate for onions. Information given includes the weeds controlled by each, and the best rates, times and methods of application.

2373. Saldarriaga V., A., Benavides G., M., and Revolo P., M.
Ensayos de contrarresto químico de las malezas de frijol en Colombia. (**Experiments in Colombia on chemical control of weeds in bean crops.**)
Agric. trop. Bogotá, 1956, **12**: 649-62, bibl. 12, illus.

Results of pre-emergence treatments are quoted from 3 localities. Chloro-IPC and a mixture of DNO amyl phenol and DNO butyl phenol were toxic to beans at rates above 6 kg. per ha. Weeds were not satisfactorily controlled by PCP at 5–10 kg. per ha. or by chloro-IPC at 4–6 kg. per ha. The best results were given by DNBP at 6–8 kg. per ha. applied evenly or at 3–4 kg. per ha. in bands, the higher rates being more suitable for the drier soils. Its action was slightly but not significantly improved by addition of 2,4-D at 0·25 kg. per ha. on sandy and 0·5 kg. on heavier soils, greater proportions being toxic to the crop.

2374. Maestri, M., and Couto, F. A. A.
Resultado preliminar sôbre o contrôle de ervas daninhas em cenouras (*Daucus carota* L.). (**Preliminary results in control of harmful weeds in carrots (*Daucus carota*.)**)
Rev. Ceres, 1956, **9**: 391-4, bibl. 3, illus.

The dominant weed among carrot seedlings was *Galinsoga parviflora*. Mechanical inter-row weeding combined with application of mineral oil at 60 ml. per m.^{2} along the rows (25 cm. apart) was more effective than overall application of 60 or 80 ml. per m.^{2} or mechanical inter-row weeding with either hand-weeding or 40 ml. of oil per m.^{2} along the rows. Production was approximately 75% higher when a second treatment was given on the reappearance of weeds.

2375. Orth, H., and Pasch, G. M.
Erfahrungen mit dem Unkrautbekämpfungsmittel Prevenol 56 (CIPC) im Zwiebel- und Möhrenanbau des Düsseldorfer Raumes. (**Observations on the herbicide Prevenol 56 (CIPC) in onion and carrot crops in the Düsseldorf area.**)
Reprinted from *Rhein. Mschr. Gemüse-, Obst- u. Gartenb.*, 1956, No. 9, pp. 2, illus.

Practical tests have shown that pre-emergence applications of Prevenol 56 gave successful weed control in onions and carrots. Spraying too long after sowing resulted in phytotoxic effects on the seedlings.

2376. Guzman, V. L.
Post-transplanting weed control of celery in organic soils.
Weeds, N. York, 1957, **5**: 40-5, bibl. 3, illus.

Two experiments are described in which the following herbicides were applied to celery directionally one month after transplanting on March 25, and as an overall spray after transplanting on September 30: CIPC, Stoddard solvent, Hydrin (mixture of aromatic hydrocarbons), CDAA, CDEA and CDEC. In the directional experiment CIPC in water at 8 lb./ac. gave very good weed control with no yield reduction. As overall sprays CDAA and CDEC each at 8 lb./ac. and a mixture of CIPC with CDEC each at 4 /lb.ac. gave good weed control without significant yield reduction.—Everglades Exp. Stat., Fla.—From *Weed Abstr.*, **6**, No. 292.

2377. Peterburgskij, A. V., Semenova, N. K., and Kiseleva, V. I.
The use of herbicides for weed control in onions and garlic. [Russian.]
Zemledelie, 1956, **4**(11): 71-4.

The triethanolamine salt of dinitrophenol [DNC] at 8 kg. per ha. applied to onions at the 3-leaf stage caused only slight yellowing of the leaves in some plants. At 4 and 6 kg. per ha. treatment of onion seed plants before flowering and of garlic from bulbs at the 2-leaf stage and from seed at the 4–5-leaf stage resulted in no injury. Autumn sown garlic treated at the 6–7-leaf stage with 4 kg. DNC per ha. produced a heavier crop than the unweeded control. Dusts of isopropyl phenylcarbamate [propham] and naphthyl phthalamic acid [NPA] at 5 kg. per ha. applied at weed seedling emergence had no depressing effect on onions. The reaction of individual weed species to the treatments was noted.

2378. Fox, W. B., and others.
[Weed control in] peas and other large seeded legumes.
Res. Rep. nat. Weed Cttee (*West. Sect.*), *Canada, 1956*, Lethbridge, Alberta, pp. 95-8.

Of 6 abstracts submitted 5 dealt with weed control in peas. Weed and crop reaction to the various herbicides applied pre- or post-emergence at different rates is noted.—From *Weed Abstr.*, **6**, No. 485.

2379. Noonan, J. C.
Use of certain herbicides in fields of growing tomatoes—progress report.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 204-7, bibl. 4, illus.

Monuron and diuron were used successfully to control seedling weeds which germinated in tomato fields after the last fertilizer application. Sprays should be applied when there is little danger of drift, as both sprays are phytotoxic to tomato plants.—Sub-trop. Exp. Stat., Homestead, Fla.

Noted.

2380.

a Anon.
Herbicides sélectifs à base d'urée substituée: monuron et diuron. (**Selective substituted urea herbicides: monuron and diuron.**)
Fruits et Prim., 1957, **27**: 15-18, illus.
A review of properties and application to various crops.

b Charles, F. R.
Un nuovo prodotto chimico per il controllo dell'erba nociva. (**A new chemical product for weed control.**) [English, French, Spanish and German summaries, 9–11 lines each.]
Riv. int. Agric., 1956, **1**(8/9): 62-4, illus.
The nature and action of MCPB in pea crops, etc.

c González, A. J.
Malas hierbas y plantas nocivas en los cañaverales. (**Weeds and harmful plants in sugar cane plantations.**)
Mem. XXIX Conf. an. Asoc. Téc. azuc. Cuba, 1955, pp. 27-36.

d Macdonald, J. R.
Spray drift.
Agriculture, Lond., 1957, **63**: 583-5.
Problems of assessing herbicide damage to crops and preventing drift and "blow-off" discussed.

e Ministry of Agriculture, London.
Docks and sorrels.
Adv. Leafl. Minist. Agric. Lond. **46**, revised 1956, pp. 5, illus.

f Ministry of Agriculture, London.
Knotgrass and allied weeds.
Adv. Leafl. Minist. Agric. Lond. **432**, 1956, pp. 5, illus.
Polygonum spp. and their control.

g National Weed Committee, Eastern Section.
1957 weed control recommendations for Eastern Canada.
[*Publ.*] *Canada Dep. Agric.*, [1956], pp. 20.
For previous report see *H.A.*, 26: 2675.

h National Weed Committee, Western Section.
1957 weed control recommendations for Western Canada.
[*Publ.*] *Canada Dep. Agric.*, [1956], pp. 26.
For previous report see *H.A.*, 26: 1641.

i Smilie, J. L.
Efficient use of sugar cane sprayers.
Sugar J., 1956, **19**(7): 22-3.
Advice on weed control operations.

j Wain, R. L.
Selective weed control with MCPB.
Agriculture, Lond., 1957, **63**: 575-9.
Mode of action and use in pea crops, etc.

k Westmoreland, W. G., and Ferguson, J. C.
Sprayers for weed control.
Ext. Circ. N.C. agric. Ext. Serv. **403**, 1956, pp. 15, illus.
Illustrations of sprayer components and descriptive notes.

l Zirojević, D.
Uticaj malih količina 2,4-D na vinovu lozu. (**The effect of small amounts of 2,4-D herbicide on vines.**) [French summary 1½ p.]
Zasht. Bilja, 1956, No. 36, pp. 29-41, bibl. 6, illus.
Injury symptoms and varietal susceptibility.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 2011, 2023, 2054, 2061, 2088r, 2170, 2249, 2275, 2685, 3001, 3002, 3009, 3012, 3015, 3019.)

2381. Dorling, M. J., and Folley, R. R. W.
East Kent horticulture. A second study of market gardening.
[*Mimeo. Publ.*] *Dep. agric. Econ. Wye Coll.*, 1957, pp. 26, bibl. 1, 2s.

A general background to market garden production in east Kent is given, and the financial status of 6 holdings in the area is reported for 1953 to 1955. [For a previous report see *H.A.*, 25: 1635.]

2382. Reinhold, J.
Die Entwicklung der Geschmacksprüfung zu einer quantitativen organoleptischen Methode. (**The development of tasting tests into a quantitative organoleptic method.**)
Albrecht-Thaer-Arch., 1956, **1**: 112-67, bibl. 20.

The author's theories are worked out on a large number of vegetables and he gives suggestions on the pertinent points on which marks should be given for different vegetables according to their taste, aroma and consistency. For instance, in assessing quality for lettuce he gives the number of grades and hence marks as follows: Appearance 2 grades, smell 5, taste 5, sweetness 3, bitterness 3, consistency 5. He certainly makes standard observations which would afford considerable help to any quality judges of vegetables and these standards could easily be adjusted to suit local preferences.

2383. Fröhlich, H.
Die Bodendurchwurzelung seitens verschiedener Gemüsearten. **(The distribution in the soil of the roots of various vegetables.)** [Russian and English summaries 11 lines each.]
Arch. Gartenb., 1956, **4**: 389-417, bibl. 25, illus.

Sketches, graphs and tables illustrate many aspects of the root system of vegetables, among them root distribution in different layers of the soil, the characteristic development of the root system in different vegetables, the amount of roots formed and decomposed in the top soil during a growing season and the amount of roots left in the soil after harvest and in the following spring. Comparisons of the weight of the roots and of the above-ground parts reflect the development of the top : root ratio through the growing season. The relations between soil moisture and mass of roots formed were found to follow recognizable rules, viz. the mass of roots increased with rising soil humidity until the optimum value for the crop was reached. After that root formation remained for a time at the same level. The top : root ratio increased with rising soil moisture. The investigations were carried out on the following crops grown in a sandy soil containing humus and a little loam: Staked and bush tomatoes, cabbage, celeriac, leeks, cucumber, clover-grass mixtures, lettuce, onions, peas and carrots.—Inst. f. Gartenb. Grossbeeren.

2384. Zemljanuhin, A. A.
The content of dehydroascorbic acid in certain plants. [Russian.]
Bjul. o-va estestvoispyt. pri Voronežsk. Un-te, 1955, **9**: 19-22, from abstr. in *Ref. Ž.* (*Biol.*), 1956, No. 22, abstr. 94405.

Repeated dehydroascorbic acid determinations were made during the growing season on the leaves of cucumber, sugar beet and several cabbage varieties. During the first phases of growth of all the plants the dehydroascorbic acid content increased from the lower leaves to the upper ones. In cabbage the dehydroascorbic acid content increased from the lower to the upper unfolded leaves but decreased in the head, which confirms the connection existing between the biosynthesis of this vitamin and photosynthesis.

2385. Åvall, H.
Försök med rullglas till bänkfönster. **(Trials with reinforced plastic in frames.)** [English and Esperanto summaries ½ p. each.]
Meddel. Trädgårdsförs. Alnarp **97**, 1956, pp. 14, bibl. 3, illus.

Trials with glass substitutes were carried out at Alnarp using an English and a German make of plastic sheeting reinforced with wire-netting. In comparison with glass, Cedra-glass did not produce satisfactory radishes, and neither glass substitute was satisfactory for lettuce production. The biggest yields of high quality cucumbers were obtained with Windolite, and Cedra-glass also gave good results. Ordinary glass gave the best results with melons.

2386. Krotova, O. A., and Naumova, A. N.
The use of bacterial fertilizers for raising seedlings in nutrient blocks. [Russian.]
Sad i Ogorod, 1957, No. 2, pp. 17-18.

At the Timirjazev Academy of Agriculture 5 × 5 × 5 cm. nutrient blocks were made of 4 parts per volume peat and 1 part cow manure solution (1 manure : 2 water) with fertilizers added as follows: 1 g. slaked lime, 0·5 g. ammonium nitrate, 6 g. superphosphate and 1 g. potassium salt per block for tomatoes, and 1·6 g., 0·4 g., 3 g. and 0·65 g. of the same fertilizers respectively for cauliflowers. The nutrient mixture was then inoculated with 5 ml. azotobacterin and/or 1 ml. phosphorobacterin solutions per block. Application of azotobacterin resulted in vigorous development of azotobacter and that of phosphorobacterin increased the number of *Bacterium megatherium* var. *phosphatium.* Yield increases were considerable in both crops as a result of the bacterial fertilizers, and in addition club root incidence in cauliflowers was reduced from 54% in the controls to 17·6%.

2387. Steigerwald, E.
Mehrjährige Versuche mit organischen und mineralischen Düngemitteln zu verschiedenen Gemüsearten. **(Several years' trials on the response of different vegetables to organic and mineral fertilizers.)**
Bayer. landw. Jb., 1956, **33**: 191-203.

Data are presented on yield and other responses of carrots, onions, beetroot, cabbage and celeriac to applications of organic and mineral fertilizers during the period 1940–49. In years with plentiful rainfall organic manures produced better results than in dry years when they appeared to retain the soil moisture so that it was not available to the plants. This is illustrated by carrots for which values for the top : root ratio ranged from 1 : 4·6 in dry years to 1 : 10·4 in wet years, the mean value for 9 years being 1 : 5·5. Organic manures also showed a tendency to improve quality by increasing the proportion of first-grade roots. Again with carrots, combined applications of organic manures and artificials resulted in considerably higher yields than equivalent amounts of either applied separately. Combined applications of peat and NPK gave good results with the crops tested, viz. red cabbage, celeriac and beetroot.—Landesanst. f. Pflanzenb. u. Pflanzensch., Munich.

2388. Rees, W. J., and Sidrak, G. H.
Plant nutrition on fly-ash.
Plant and Soil, 1956, **8**: 141-59, bibl. 17, illus.

Chemical analysis figures are given for fly ash, an industrial waste product from power stations. It is very low in total N and contains Al and Mn in proportions toxic to spinach, the yield of which was improved by adding NPK fertilizer to the ash though it still remained below that in soil. Toxicity symptoms are described for cabbage, cauliflower, mustard, sprouts, swede, tomato and dwarf and runner beans grown in fly ash irrigated with complete culture solution. In all the crops except mustard there was marked reduction of P uptake and tomato leaves showed a 7-fold increase of Al. Growth of mustard was more vigorous and flowering was earlier on ash-soil mixtures than on ash or soil alone, but Mn leaf-scorch symptoms increased with rising proportions of ash in the mixture. Growth of sprouts and cabbage on soil and ash-soil mixtures differed very little except for slight leaf cupping on the latter.—Bot. Dep., Univ. Birmingham.

2389. Prevot, P.
Les oligo-éléments chez les végétaux. **(Trace elements in plants.)**
Oléagineux, 1957, **12**: 141-4, bibl. 12.

A review, quoting maximal and minimal contents of B, Mo, Cu, Mn and Fe in broad bean, tomato, cabbage, spinach and lettuce, and discussing diagnosis of trace-element deficiencies in various crops.

2390. Lambeth, V. N.
Studies in moisture relationships and irrigation of vegetables.
Res. Bull. Mo. agric. Exp. Stat. **605**, 1956, pp. 55, bibl. 63, illus.

The data given afford indications on the desirability of irrigating particular vegetable crops under Missouri conditions and show how their requirements can reasonably be determined and how the process can be economically carried out.

2391. Gotovcev, I. Ja.
Windbreaks for vegetables. [Russian.]
Sad i Ogorod, 1957, No. 3, pp. 18-19.

Examples are given showing the favourable effect of tall plants, sown in strips 0·6–1·8 m. wide and 5–7 m. apart, on yield and earliness in cucumber, tomato, cabbage, sugar beet and early potato. Air temperatures in the morning and evening and on cool and windy days were 2–4° C. higher between the strips than on the control plots; soil temperatures at a depth of 10 cm. were 2–3° C. higher and at 20 cm. 1–2° C. higher; and wind velocity at a height of 50 cm. was reduced by 40–70%. The most suitable plants for windbreaks were winter rye, sunflower, fodder cabbage and maize; tomato or potato could also be used as windbreaks for cucumbers.

2392. Miller, P. M., and Linn, M. B.
Viability of cabbage, carrot, sweet corn and lima bean seed treated with thiram or copper oxinate and stored at three different temperatures.
Plant Dis. Reptr, 1957, **41**: 308-11, bibl. 11.

Cabbage, carrot, sweet corn and lima bean seed treated with thiram or bioquin 1 and stored for 4, 8 or 12 months at 2°, 14° or 32° C. generally showed no viability loss directly attributable to the fungicides. Treated seed usually germinated better than untreated. It is suggested that the increased viability of treated over non-treated seed is due to control of seed-borne organisms which attack the seed directly in storage or after planting. [From authors' summary.]—Conn. agric. Exp. Stat., New Naven, and Univ. Ill., Urbana.

2393. MacLagan, D. S.
Effects of modern insecticides on growth of plants.
Nature, 1957, **179**: 1197-98, bibl. 5.

In the course of studies on the maximum "load" of insecticide, which can be borne by various vegetable seeds without the inducement of phytotoxic symptoms, the author obtained evidence of a non-insecticidal, chemical stimulant effect on plant growth despite the absence of insect attack. In parsnip seedlings, for instance, a *depressant* action on root growth was shown by seed-dressings of γ-BHC and dieldrin at 2·5% by weight of seed, but a *stimulant* action by 2% γ-BHC. All the dressings were phytotoxic up to fourteen days, but after that the growth-stimulation of the lighter γ-BHC dressing became apparent. Other data refer to the roots of mangold seedlings. It is suggested that the heterogeneous growth response of seedling populations to chlorinated hydrocarbon insecticides may provide the plant breeder with a new tool for the propagation of vigorous strains.—West of Scotland Coll. Agric.

2394. Wright, J. M.
Biological control of soil-borne *Pythium* infection by seed inoculation.
Plant and Soil, 1956, **8**: 132-40, bibl. 17.

Pythium sp. was isolated from infertile soil and proved to be pathogenic to a wide range of crops, including mustard, cabbage, lettuce and flax. Disease symptoms in white mustard were controlled to some extent by dusting seeds with spores of *Trichoderma viride*, *Penicillium nigricans*, *P. frequentans* and *P. godlewskii.* Strains of *T. viride* differed in antibiotic activity, one that produced gliotoxin being most effective against the pathogen. Disease symptoms were reduced by changing soil pH from 6 to either 3·5 or 7·8, and seed inoculation with *T. viride* increased the protective effect of the alkaline but not of the acid soil.—I.C.I. Ltd., Akers Res. Labs, Welwyn.

2395. Zanardi, D.
Prove di laboratorio sull'efficacia antifungina di alcuni anticrittogamici. **(Laboratory tests on the antifungal effectiveness of some fungicides.)**
Not. Mal. Piante, 1957, No. 39, pp. 67-71, illus.

The test plates were infected with soil from onion, spinach and red-pepper beds, containing *Sclerotinia cepivora*, *Peronospora parasitica*, *Phytophthora parasitica* and *Fusarium* spp. Control of bacteria was complete with Amycin (Quinosol) and decreased with other products in the order: Vapam, Zineb and PCNB. Except for the last substance antifungal activity was very high.

2396. Overman, A. J., and Burgis, D. S.
Fungicidal, herbicidal and nematocidal effects of fumigants applied to vegetable seedbeds on sandy soil.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 250-5, bibl. 5.

An allyl alcohol drench plus Nemagon or D-D applied to vegetable seedbeds was effective as fungicide, nematocide and herbicide. Vapam and Crag Mylone also gave good results on Florida sandy soils.—Gulf Coast Exp. Stat., Bradenton, Fla.

2397. Bowman, J. S., and Casida, J. E.
Metabolism of the systemic insecticide O,O-diethyl S-ethylthiomethyl phosphorodithioate (Thimet) in plants.
J. agric. Food Chem., 1957, **5**: 192-7, bibl. 18.

The persistence was studied of radioactive Thimet or its metabolites following seed treatment of cotton and foliage and soil treatment of 6 vegetable crops. The results given for the vegetables are averages of figures from bean, beet, cabbage, carrot, lettuce and pea in the same field plot.

2398. Showalter, R. K., and Thompson, B. D.
Vacuum cooling of Florida vegetables.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 132-5, bibl. 4.

Vacuum cooling has been successfully applied to lettuce, broccoli, spinach, radish, cauliflower, endive, chicory, cabbage, sweet corn and celery. The cooling process was not affected by the bulk containers and prepackaged vegetable containers tested.—Fla agric. Exp. Stat., Gainesville.

Artichokes.

2399. Ghisleni, P. L.
Erogazione continua e modulata nel trattamento ultracustico a semi di carciofo (*Cynara scolymus* L.). **(Continuous and modulated administration of ultrasonic treatment to seeds of globe artichoke (*Cynara scolymus*).)**
Nuovo G. bot. ital., 1955 (issued 1956), **62**: 549-51.

Vibrations of 15 and 38 W. were each administered for 30 and 90 min. The same quantities and durations of vibration were also given with a sinusoidal fluctuation of frequency $\frac{1}{10}$ sec. Germination percentage was reduced very significantly by the maximal dose of either constant or fluctuating treatment and significantly by 38 W. for 30 min. The slight reductions in other treatments were not significant. Germination time was slightly shortened by the lower intensity, but slightly prolonged by the 30 min. and very significantly prolonged by the 90 min. treatment at the higher intensity, whether continuous or fluctuating.

Asparagus.

(*See also* 2349.)

2400. Banham, F. L., and Handford, R. H.
Control of cutworms in asparagus fields in the interior of British Columbia.
Canad. J. Plant Sci., 1957, **37**: 108-12, bibl. 11, illus.

Emulsions of dieldrin, aldrin, isodrin, toxaphene and chlordane applied to the soil surface and incorporated to a depth of about 4 in. proved highly effective in controlling the red-back cutworm, *Euxoa ochrogaster*, when tested in asparagus fields in the interior of British Columbia in 1953 and 1954. Bran bait containing paris green, although giving fairly satisfactory control, was less effective and slower in action than the emulsions. Dieldrin, aldrin and isodrin dusts, applied to the soil surface, were superior to and faster in action than bran baits containing aldrin or endrin. A survey of asparagus fields treated by growers indicated that aldrin emulsion, mixed with the soil at about 4 lb. of toxicant per acre, protects asparagus for at least 2 years. [From authors' abstract.]—Ent. Lab., Kamloops, B.C.

Brassicas.

(*See also* 2022, 2026, 2034, 2047, 2066, 2332, 2383, 2384, 2386, 2387, 2392, 2556n, x, 2557k, w.)

2401. Smith, M., and Kanagaratnam, N.
Cauliflowers in the highlands.
Malay. agric. J., 1956, **39**: 217-19, bibl. 2.

Obstacles which have prevented the expansion of the small cauliflower industry in the Cameron Highlands are discussed. In two recent variety trials the highest yields were given by Sutton's Snowball. The variety Burpeeana, previously regarded as the most suitable, yielded poorly by comparison, and the Hawaiian-bred variety Pua Kea failed to head.

2402. Rejmers, F. E̊., and Habardin, M. I.
Raising early seedlings without covering with frame sashes. [Russian.]
Sad i Ogorod, 1957, No. 1, pp. 31-5.

In Eastern Siberia cabbage and tomato seedlings raised in surface frames without sashes produced as high yields as those raised in conventional covered frames. The seed beds were covered with mats during the night and in exceptionally bad weather were uncovered for only 4–5 hours during the day.

2403. Persson, A. R., and Olasveengen, R.
Bruk av jord-, leir- og huminalpotter ved dyrking av tidligkål. **(The use of soil, loam and Huminal pots for the raising of early cabbage plants.)**
Gartneryrket, 1957, **47**: 295-8, illus.

In 4 years' experiments, but particularly in the dry summer of 1955, loam pots proved superior to the other types of pot tested for the raising of early cabbage and cauliflower plants.—Inst. Veg. Growing, Norweg. Coll. Agric.

2404. Rada, B. F.
Raising seedlings in pure peat with AMB. [Russian.]
Sad i Ogorod, 1957, No. 2, pp. 18-22, illus.

Cabbage plants raised in frames in peat to which lime and AMB bacterial fertilizer were added matured earlier and produced higher yields than those raised in soil or nutrient blocks. Other vegetables, especially cucurbits, also responded favourably to AMB-treated peat.

2405. Fomin, E. M.
The effectiveness of organo-mineral fertilizers. [Russian.]
Sad i Ogorod, 1957, No. 2, pp. 24-5.

The standard mixture recommended by the All-Union Academy of Agricultural Sciences consists of 5 tons compost, and 3 centners each of superphosphate and lime. In experiments with cabbage better yields were obtained when 1 centner of a potassium salt was added to the mixture, applied at 5–6 tons per ha., and further improvement resulted from the addition of both the potash and 2 centners of ammonium nitrate.

2406. Širokov, E. P.
Regulating the maturation of certain vegetables with molybdenum and iodine. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(2): 26-8, bibl. 5.

Seed of cauliflower, red cabbage, savoy and lettuce was soaked for 10 hours in a 0·01% solution of ammonium molybdate and potassium iodide, and later 0·001 to 0·004% solutions of the nutrients were applied repeatedly to the seedlings. Treatment with Mo accelerated maturation while that with I retarded it. Mo increased the yield of cauliflower but induced earlier bolting in lettuce. Iodine retarded bolting in lettuce and increased yields. Biochemical changes due to the 2 microelements are discussed.

2407. MOUNSEY-WOOD, B. W. L.
Some factors causing blindness in early summer cauliflowers.
J. hort. Sci., 1957, **32**: 65-73, bibl. 3.

The effects of different sowing and planting dates on blindness, yield and quality of early summer cauliflower were studied over 4 years. There was great variation in the amount of blindness from one year to another; within limits sowing date also influenced the amount of blindness. Planting date had little direct effect on blindness, but late planting encouraged the October sowings to re-root more readily, consequently reducing blindness. Early sowing increased weight of crop (trimmed heads) per plot, size of head, solidity of curd, the number of perfectly shaped heads, and other quality characters. Though planting date had less influence than sowing date, early planting tended to give the greatest weight per plot, but had little effect on quality characters. Frost periods, particularly in late autumn, affected the subsequent amount of blindness; severe cold after Christmas, when the plants were older, had no effect. Factors which may ameliorate the effect of late sowing date are discussed. [From author's summary.]—Kirton exp. Husbandry Fm.

2408. KENAGA, C. B., AND KIESLING, R. L.
Control of three foliar diseases by several fungicides in greenhouse tests.
Plant Dis. Reptr, 1957, **41**: 303-7.

Acti-dione, Panogen 15, hexachlorobenzene, and the Omadine salts of copper, zinc, manganese, and sodium were applied as foliar sprays to cabbage, bean and corn to control *Phoma lingam*, *Colletotrichum lindemuthianum* and *Puccinia sorghi*. Most of the treatment means showed highly significant control. However, better control was obtained with sodium Omadine, copper Omadine and Panogen 15 than with the other 5 compounds tested. At higher temperatures Panogen 15 reduced the amount of *C. lindemuthianum* infection to a trace, while infection in the checks was increased. [From authors' summary.]—Mich. St. Univ.

2409. STRICKLAND, A. H., AND OTHERS.
Cabbage aphid assessment and damage in England and Wales, 1946-55.
Plant Path., 1957, **6**: 1-9, bibl. 2.

Results have been collected from both field trials and an extensive survey, and a comprehensive summary of work in yield loss in sprouts caused by cabbage aphid (*Brevicoryne brassicae*) is presented. In field trials it was found in general that treatment with a systemic insecticide in mid-June reduced the average density of aphids in July from about 6 to about 1 per sample, and another application in August reduced peak density in September from about 18 to about 2 per sample. On both treated and untreated plots aphids increased rapidly when favourable conditions occurred. More aphids survived treatment when population density was high than when it was low. Analysis of field trial results showed that unit aphid values (Log(N+1): 1·00 aphids per 3-leaf sample, or, detransformed, 9 aphids per sample) will decrease yields by 3·9 and 4·7 cwt. per acre early and late in the season respectively. Economically, a density value of 0·45 aphids per 3-leaf sample appeared to be worth controlling in July. Experience gained from an extensive survey of peak cabbage aphid populations on unsprayed commercial sprout fields in England and Wales, and problems of sampling, are discussed. National losses in the sprout crop due to cabbage aphid are estimated at £1 million per annum. It is concluded that August and September spraying is often worth while, but a greater general yield increase could be obtained by ensuring clean plants during the period just after planting out. [For an earlier report see *H.A.*, 25: 1666.]

Celery.

(*See also* 2034, 2329, 2520, 2556g.)

2410. COX, R. S.
Control of diseases in the celery seedbed.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 242-4.

Colletotrichum sp. is reported for the first time as occurring on celery seedlings. Control of various diseases in the seedbed may be obtained by soil fumigation before sowing followed by foliar sprays. Two spray programmes which have given good results are Chloranil plus zineb and streptomycin, and neutral copper plus zineb and streptomycin. Thylate has given good control of damping-off and early blight. Dyrene has also shown promise in early blight control.—Everglades Exp. Stat., Belle Glade, Fla.

Cucurbits.

(*See also* 2034, 2072, 2332, 2337, 2383, 2384, 2404, 2445, 2449, 2556h, 2557a, j, x.)

2411. (BOUHELIER, —., AND OTHERS.)
Étude sur les pastèques. Compte-rendu d'essais comparatifs de variétés en culture irriguée. Liste descriptive des fruits des variétés d'origine américaine introduites au Maroc par le Service de l'Horticulture (par ordre alphabétique). **(Study on watermelons. Summary of variety trials on irrigated land. Descriptive alphabetical list of fruits of American origin introduced into Morocco by the Horticultural Service.)**
Terre maroc, 1957, **31**: 14-23, 47-9.

Part I compares growth cycles and yields of 8 American and 2 Moroccan varieties at two different localities in Morocco. Part 2 describes the fruits of 24 American varieties grown or intended for cultivation in Morocco.

2412. BRENNA, H. K., AND WEISOETH, G.
Planting av frilandsagurk. **(The planting of field cucumbers.)**
Gartneryrket, 1957, **47**: 97-9, bibl. 5, illus.

Yields of cucumbers raised in pots and later planted out in the field greatly exceeded those from plants which were raised from seed directly sown in the field. Data are tabulated and methods of raising the seedlings are described.—Inst. Veg. Cult., Norw. Coll. Agric.

2413. GRUNEWALD, J.
Weitere Versuche zur Verwendung von Wirkstoffen bei der Gurkenanzucht. **(Further studies on the use of hormones in cucumber growing.)**
Gartenbauwiss., 1956, **3**: 292-305, bibl. 2.

The effect of seed treatment with several growth substances on cucumber growth was studied. Tests showed that at low light intensity dl-alanin, indole and testosterone increased plant vigour. In conditions of high light intensity 2,4-dichlorophenoxyacetic acid and calcium pantothenate were more effective. No definite results were obtained with aneurin, Multibionta, inositol, sodium-p-amino-benzoicum, phenylacrylic acid or indolyl-3-butyric acid gave no results in these tests.—Inst. Gemüseb, Berlin.

2414. VAŠČENKO, S. F.
Phasic development of cucumber. [Russian.]
Agrobiologija, 1956, No. 5, pp. 149-50, bibl. 9.

Optimum germination conditions for cucumber seed were 50–64% moisture content at 20–26° C., and the highest yields were obtained when the seedlings were raised at 10–12 hr. daylength, 20–25° C. day and 15–18° C. night temperatures with 85–95% R.H.

2415. ZAURALOV, O. A.
Characteristics of the phasic development in melon and watermelon. [Russian.]
Agrobiologija, 1956, No. 5, pp. 144-6.

The vernalization and light phases in melons and watermelons are comparatively short and are of about equal duration in varieties with different growth periods. Differences in the growth period depend on the time of female flower formation and the length of fruit maturation. The phasic condition of plants can be estimated by changes in some physiological characteristics such as peroxidase and polyphenoloxidase activity.

2416. PARKINSON, A. H.
10s. more per plant from cucumbers.
Grower, 1957, **47**: 619-25, illus.

Extra light given to seedlings of B.D.R. and Market Cross advanced the cutting date by 6–8 days and increased the numbers of cucumbers by 3–10 per plant. At Hutton (Lancs.) Market Cross was equalled or outyielded by B.D.R. Lining a cucumber house with polythene was initially beneficial to B.D.R. growth, but fewer cucumbers were produced than from an unlined house.

2417. GRUNEWALD, J.
Bericht über einen Gurkenversuch mit verschiedenen mineralischen Volldüngern. **(Report on cucumber trials with different complete fertilizers.)** [English, French and Spanish summaries 4 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 20-3.

Mairol (14% N, 12% P_2O_5, 14% K_2O, 0·9% $MgSO_4$) and Hortal (4% N, 20% P_2O_5, 32% K_2O, 6% $MgSO_4$) gave the most satisfactory results when applied to a second crop of glasshouse cucumbers.—Inst. Gemüseb., Tech. Univ. Berlin.

2418. GEISSLER, T.
Die Verwendung von Nährlösungen aus Düngemitteln bei der Hydrokultur von Treibgurken. **(The use of commercial fertilizer solutions in water culture of cucumbers.)**
Dtsch. Gartenb., 1957, **4**: 57-9, illus.

The effects on cucumber growth and yields were compared of various nutrient solutions, using commercial fertilizers or pure chemicals. In general yields were earlier with the commercial fertilizer solutions. Highest yields were obtained from the fertilizer plus trace element solution. Pure chemical solutions cost about 3 times as much as fertilizer solutions. In a comparative practical trial mineral culture of cucumbers produced about 20% more fruits than did soil culture.

2419. v. HÖSSLIN, R.
Der Einfluss verschiedener Schnittmassnahmen auf Wüchsigkeit und Fruchtbarkeit zweier Kastengurken-Sorten. **(The effect of different pruning methods on vigour and fruitfulness of two glasshouse cucumber varieties.)**
Gartenbauwiss., 1956, **3**: 165-76, bibl. 5.

In general unpruned and lightly pruned plants grew better than severely pruned plants. Weaker growth after hard pruning was attributed to loss of assimilating surface. Unpruned plants had best growth of leading shoots and primary side shoots. Severely pruned plants showed much branching. Lightly pruned plants were less susceptible to mildew than were severely pruned plants. Total and marketable yields were in general highest with light or no pruning. No effect on fruit quality was observed.—Inst. Gemüsebau, Weihenstephan.

2420. HEINZE, W.
Versuche mit Wachstumsregulatoren bei Melonen. **(The experimental application of growth substances to melons.)**
Arch. Gartenb., 1956, **4**: 312-19, bibl. 14, illus.

Although the concentrations of triiodobenzoic acid used in these preliminary experiments (50 and 200 mg./l.) were too high, results so far suggest that spraying young melon plants with the growth substance may affect sex expression of the flowers. The work continues.—Landw.-gärtn. Fak. Humboldt-Univ. Berlin.

2421. VAN GUNDY, S. D., AND WALKER, J. C.
The amino-nitrogen nutrition of *Pseudomonas lachrymans*.
From abstr. in *Phytopathology*, 1957, **47**: 35.

The susceptibility of cucumber as a host of *Pseudomonas lachrymans* was found to be in part dependent upon the relative level of amino nitrogen in the leaves. Mature leaves were most resistant; leaves approaching maturity were most susceptible. Averages of 4 readings per day for old and young leaves, respectively, were 3 and 6 mg. carbohydrate and 100 and 200 µg. nitrogen per g. wet weight of leaf tissue. Highest disease development occurred in plants given high N or low K nutrients and least in those given low N. In leaf tests the soluble carbohydrates remained nearly constant at all nutritional levels. Plants provided with high N contained up to 5 times as much amino N as did plants very deficient in N. Plants deficient in K had a high level of amino N. When the amino N per g. of wet weight was 100 μg. or less, disease development was suppressed. Nutrition studies with 6 different isolates given various concentrations of asparagine and sucrose showed little increase in growth of the organism at levels below 100 μg. asparagine N, regardless of the sucrose level. Increases in asparagine N above 100 μg. rapidly reduced the requirement of sucrose for maximum growth in culture.

2422. Horn, N. L., Wilson, W. F., and Giamalva, M.

Seed and insect transmission of cucumber anthracnose.

Plant Dis. Reptr, 1957, **41**: 69-71, bibl. 3.

Cucumber anthracnose, caused by *Colletotrichum lagenarium*, was found to be seed-transmitted in 6 out of 50,000 seedlings grown from commercial seeds. The organism was transmitted by the cucumber beetle *Diabrotica undecimpunctata howardi* in greenhouse tests. Seedlings did not become infected when grown in soil that was thoroughly infected with anthracnose 10 months previously. [From authors' abstract.]—La St. Univ. Exp. Stat., Baton Rouge.

2423. Plantenziektenkundige Dienst, Wageningen.

Ziekten en plagen in 1955. Komkommer. Bladvuur, *Corynespora melonis*. (**Pests and diseases in 1955. *Corynespora melonis* on cucumber.**)

Jaarb. PlZiekt. Dienst, Wageningen, 1955, 1956, p. 72.

After treatment with organic mercury against leaf spot disease of cucumber, mercury residues in the fruit were often too high at the time of marketing. It is recommended that Bulbosan dust should be used for control. Zineb or captan may also be used.

2424. McKeen, C. D.

Phomopsis black rot of cucurbits.

Canad. J. Bot., 1957, **35**: 43-50, bibl. 15, illus.

A new species, *Phomopsis cucurbitae*, is described as the chief causal agent of a black rot disease of greenhouse cucumbers in Ontario. In addition to causing stem canker, the fungus occasionally causes decay of fruits. Similarities in macroscopic symptoms caused by *P. cucurbitae* and by another fungus, *Mycosphaerella melonis*, that also causes black rot of cucurbits, are pointed out. The pathogenicity of *P. cucurbitae* on cucurbits and tomato is discussed. The disease was not controlled by fungicidal sprays such as ferbam, wettable sulphur or copper products, but its spread was checked by good ventilation, to dry up moribund tissues which would have formed reservoirs of infection. —Sci. Serv. Lab., Harrow, Ont.

2425. Sowell, G., Jr.

Cucumber fungicides for the west coast of Florida.

Proc. Fla St. hort. Soc., 1956, 1957, **69**: 230-4, bibl. 14.

Soil rot of cucumbers, *Rhizoctonia solani*, was significantly reduced by 32 lb. of 50% captan per acre applied when the plants were young or when the disease appeared. Control was also obtained by weekly applications of captan, alternating with nabam+$ZnSO_4$ [see also *H.A.*, 26: 2783]. Downy mildew was controlled and yield of marketable cucumbers increased by applications of maneb and nabam+$ZnSO_4$. Maneb controlled powdery mildew under conditions of moderate disease development. Karathane and Ovex were outstanding in their performance against powdery mildew.—Gulf Coast Exp. Stat., Bradenton.

2426. Conover, R. A.

Phytotoxicity of fungicides to cantaloupes.

Proc. Fla St. hort. Soc., 1956, 1957, **69**: 198-200.

Fungicides for downy mildew control were tested for their phytotoxicity to cantaloupes. Carbamates caused slight to severe injuries to the plant with deleterious effects on yield and size of melons. Zineb was the safest of the fungicides recommended for downy mildew control, and karathane also appeared safe for use.—Sub-trop. Exp. Stat., Homestead, Fla.

2427. Heiligman, F.

New wax cuts losses.

Amer. Veg. Gr, 1957, **5**(1): 28-9, illus.

The addition of 0·5% sorbic acid to the wax with which cucumbers were treated after they had been inoculated with *Erwinia carotovora* and *Mycosphaerella citrullina* reduced the loss after one month's storage at 55° F. and 85–90% R.H. from 92% to 11%. When fruits were not inoculated no appreciable decay occurred when they were treated with sorbic acid wax, whereas with normal waxing losses up to 7·9% occurred.—Quartermaster Food and Container Inst. for the Armed Forces.

2428. Ford, K. E.

Hydrocooling cantaloupes.

Proc. Fla St. hort. Soc., 1956, 1957, **69**: 138-40.

It was found that the soluble solids content at the end of an 8-day storage period was higher in cantaloupes which had been hydrocooled than in those not hydrocooled.—Ga Exp. Stat., Experiment.

2429. Breakiron, P. L., and others.

Crosswise loading of long-type watermelons.

Market. Res. Rep. U.S. Dep. Agric. **133**, 1956, pp. 35, bibl. 3, illus.

Shipping experiments by rail from Florida, Georgia and South Carolina to northern markets with the long Congo watermelon during 1953 and 1954 showed that a very great reduction in bruising resulted from loading all the melons crosswise instead of in the conventional way lengthwise. The background of the study and its details are set out very clearly with ample and useful illustrations. Figures are given of comparable damage in different packs.

Legumes.

(*See also* 2014, 2025, 2026, 2029, 2031-2034, 2039, 2040, 2046-2048, 2056-2058, 2066, 2087x, 2088i, l, 2333, 2383, 2392, 2408, 2499, 2502, 2512, 2556e, i, l, o, u, 2557g, o, q, r, t, 2658, 2776, 3014.)

2430. Buishand, T.

Rond de teelt van stamslabonen. (**The culture of dwarf beans.**) [English summary ¾ p.]

Meded. Proefst. Groent. Volle Grond, Alkmaar **4**, 1956, pp. 75, illus.

The results of dwarf bean variety trials throughout the Netherlands and also in Belgium are summarized. The most reliable cropper for normal cultivation is the stringless Dubbele Witte, which is recommended in spite of its susceptibility to viruses.

2431. Ševčuk, T. N.
Local bean varieties in Transcarpathia. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1956, **21**(10): 14-18, illus.

The varieties include forms of *Phaseolus vulgaris* and *P. multiflorus*. They are productive, large seeded, with a high (22·62–28·42%) protein content and are resistant to anthracnose and bacteriosis.

2432. Pčelarov, V.
Varietal studies on garden peas. [Bulgarian, with Russian summary ½ p.]
Nauč. Trud. Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1956, **3**: 267-73, bibl. 7.

In Bulgaria the Soviet pea varieties Rannij Mozgovoj Gk-14 [Early Marrowfat] and Štambovoj Mozgovoj Gk-3 [Determinate Marrowfat] were found to be the most suitable for processing and mechanical harvesting. They cropped well.

2433. Pčelarov, V., and Šiškova, M.
Studies on processing quality in some garden pea varieties. [Bulgarian, with Russian summary ½ p.]
Nauč. Trud. Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1956, **3**: 275-88, bibl. 7.

In pea varieties with smooth seeds carbohydrate movement was more rapid than in varieties with wrinkled seeds. The latter are considered to be more suitable for processing as they mature more slowly and the processing season can be extended.

2434. Idle, D. B.
Studies in extension growth. II. The light-growth responses of *Vicia faba* L.
J. exp. Bot., 1957, **8**: 127-38, bibl. 16.

The changes of the rate of elongation of the stem of dark-grown *Vicia faba* seedlings, after illumination by white light, have been measured by auxanometer. Illumination of the plumular hook region, including the apex, causes a reduction in the extension rate of the tissue below. This has been called the 'primary phase', and it is complete within 3 hours of illumination. In the range of exposure used, the new rate may be between 50 and 20% of the original rate. Illumination of the extending tissue alone causes a similar primary phase, which is followed by a period of acceleration during the third hour after illumination. This period has been called the 'reaction phase', and it reaches its peak rate, which is of the order of 60% of the original rate before treatment, about 4 hours after illumination. Illumination of the whole plumule causes a primary phase followed by a reaction phase of more variable form and size. The magnitude of the primary phase appears to increase with the exposure. There is an optimum exposure for the production of the reaction phase in the region of 200 foot-candle seconds. The significance of these results in the interpretation of etiolation phenomena is discussed. [Author's summary.]—Univ. Southampton. [For Part I see *H.A.*, 27: 64.]

2435. Karmanov, V. G., and Pumpjanskaja, S. L.
The influence of photoperiodic rhythm of growth on the transpiration of beans. [Russian.]
Agrobiologija, 1956, No. 6, pp. 117-24, bibl. 15.

Through the development of electrical methods of studying transpiration, possessing high sensitivity and low inertia, the following conclusions have been reached. Under constant external conditions (temperature, humidity, intensity of illumination) the transpiration of beans grown in luminescent light has a defined daily rate reaching a maximum approximately 6 hours after switching on the light. The internal daily rhythm of transpiration can be observed only under certain photoperiodical conditions, i.e. 10 to 20 hours daily illumination. At shorter or longer day-lengths the effect of external conditions appears dominant; in the former case suspension of transpiration takes place after switching on the light and in the latter (uninterrupted illumination) continuous transpiration occurs throughout the 24 hours. The internal rhythm of transpiration appears to be stable and is retained for about 24 hours after changing over to new photoperiodic conditions.

2436. Rovira, A. D.
Plant root excretions in relation to the rhizosphere effect. I. The nature of root exudate from oats and peas. II. A study of the properties of root exudate and its effect on the growth of micro-organisms isolated from the rhizosphere and control soil. III. The effect of root exudate on the numbers and activity of micro-organisms in soil.
Plant and Soil, 1956, **7**: 178-94, bibl. 34; 195-208, bibl. 12; 209-17, bibl. 16.

Paper chromatographs showed that pea roots excreted considerable amounts of amino compounds during 21 days' seedling growth. Fructose and glucose were excreted only during the first 10 days. Fluorescent and ultra-violet-absorbing compounds were also excreted. Stimulation of soil and rhizosphere micro-organisms by the exudate is described.—Inst. Microbiol., Uppsala, Sweden.

2437. Katznelson, H., Rouatt, J. W., and Payne, T. M. B.
The liberation of amino acids and reducing compounds by plant roots.
Plant and Soil, 1955, **7**: 35-48, bibl. 33, illus. [received 1957].

Drying and remoistening of different plants [including peas and tomatoes] grown in sand and in a sand-soil mixture resulted in the liberation of appreciable amounts of amino acids and detectable amounts of reducing compounds. Small quantities of amino acids were produced even under normal conditions of growth. The amino acids produced could be utilized for growth by amino-acid-requiring bacteria isolated from soil. Peas grown under aseptic conditions also yielded small amounts of ninhydrin-positive substances. These results are discussed in relation to the incidence of amino-acid-requiring bacteria in the rhizosphere. [From authors' summary.]—Dep. Agric., Ottawa, Canada.

2438. Tandon, O. B., and others.
Nutrients in Central American beans.
J. agric. Food Chem., 1957, **5**: 137-42, bibl. 21.

The factors influencing protein, methionine, lysine and tryptophane contents of 25 bean varieties were studied in Guatemala. Niacin, thiamine and riboflavin were also determined. Differences in N and tryptophane contents among varieties and between localities were highly significant. The fertility of the land significantly altered the yield and riboflavin content of the kidney bean, but the contents of N, methionine, lysine, tryptophane, niacin and thiamine were not detectably affected by fertility differences.

2439. Haddock, J. L., and Linton, D. C.
Yield and phosphorus content of canning peas as affected by fertilization, irrigation regime, and sodium dicarbonate-soluble soil phosphorus.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 167-71, bibl. 7.

On highly calcareous loam yields of seeds and vines of canning peas were significantly raised by P fertilizers applied at, or a year before, planting. Residual action was small two years after application. The optimal water application was 10 inches. The effects of P application on the P content of the plants were apparent with early, but not with late, sampling; the reverse obtained for the effects of irrigation. For good growth at least 1,600 p.p.m. of extractable P should be present in the plants, and 40 lb. of bicarbonate-soluble P per acre 6 in. in this type of soil.—Soil and Water Conserv. Res. Branch, U.S.D.A., Logan, Utah.

2440. Boawn, L. C., Viets, F., Jr., and Crawford, C. L.
Plant utilization of zinc from various types of zinc compounds and fertilizer materials.
Soil Sci., 1957, **83**: 219-27, bibl. 11.

Red Mexican beans (*Phaseolus vulgaris*) grown in pots absorbed much more Zn from disodium zinc ethylenediaminetetraacetate than from zinc sulphate, the difference being greater at low than at high N level.

2441. Vámosi, J.
Új módszer a termés lepusztulásának kiküszöbölésére, az elrúgás veszélyének csökkentésére. **(A new method for controlling yield reduction due to fruit drop.)**
Időjárás, 1956, No. 1, pp. 36-44, from abstr. in *Hung. agric. Rev.*, 1956, **5**(3): 13.

Yields of legumes and other crops are often reduced owing to dropping of buds, flowers and young fruits. Studies were conducted with beans (*Phaseolus vulgaris*) to establish environmental factors affecting abscission, the periods of their effectiveness and varietal reactions. It was found that under conditions of ample rainfall or irrigation, mainly on soils with poor water economy, varieties in which the weekly maximum development and bud formation coincide are the most susceptible to fruit drop.

2442. Hagedorn, D. J.
Water congestion in canning peas.
From abstr. in *Phytopathology*, 1957, **47**: 14.

A previously undescribed nonparasitic disease of canning peas, which is due to water congestion, occurs commonly in Wisconsin. The outer edges of leaflets and stipules are affected primarily. Symptoms consist at first of a water-soaked, darkened appearance of diseased tissue, followed by a collapse and drying of such areas. As drying takes place the dead tissue turns straw-coloured. In severe cases leaflets and stipules are malformed and much smaller than normal. Controlled greenhouse experiments indicated that the disease developed most rapidly and severely under conditions of high temperature, high soil moisture, and high relative humidity. Peas grown under greenhouse conditions in clay or muck soil developed more disease than did those grown in sandy or silt loam soil. Early fast-growing pea varieties such as Alaska and Thomas Laxton were generally more susceptible than were late maturing varieties.

2443. Heintze, S. G.
The effects of various soil treatments on the occurrence of marsh spot in peas and on manganese uptake and yield of oats and timothy.
Plant and Soil, 1956, **7**: 218-36, bibl. 24, illus.

Application of sodium molybdate or zinc sulphate to manganese deficient soils increased the incidence of marsh spot in peas but was without effect on peas grown on a mineral manganiferous soil. On some soils the total manganese content of pea seeds was reduced by molybdate or zinc application. Peas affected with marsh spot contained higher amounts of amino acids than healthy peas and addition of molybdate to the soil increased the amino acid content of peas. Manganese dioxide was reduced more readily by suspensions of peas from soils with added molybdate or urea than from untreated soils. [From author's summary.]—Rothamsted exp. Stat., Harpenden, Herts.

2444. Porter, F. M., and others.
Suppression by two substituted carbamates of symptoms induced by southern bean mosaic virus.
Abstr. in *Phytopathology*, 1957, **47**: 27.

A study of the effects of antibiotics and other compounds on virus-infected plants demonstrated that certain substituted carbamates suppressed symptom formation in Pinto bean stems freshly inoculated with southern bean mosaic virus. Application of either furfuryl 5-chloro-2-methylcarbanilate or furfuryl carbanilate in lanolin immediately following stem inoculation resulted in almost complete suppression of symptoms without apparent injury to the plants. A "2-phase" carrier system composed of 1 volatile and 1 nonvolatile carrier proved satisfactory for treatments prior to inoculation. Use of furfuryl 5-chloro-2-methylcarbanilate in this carrier system either before or immediately after inoculation resulted in complete suppression of symptoms. The effect was, however, associated with slight localized injury of the stem.

2445. deZeeuw, D. J., and Davis, R. A.
Comparative effectiveness of four classes of seed-treatment materials on peas, beans, and cucumbers.
From abstr. in *Phytopathology*, 1957, **47**: 7.

Nine insecticides, 18 organic fungicides, 9 mercury fungicides and 9 organic fungicide-insecticide combinations were tested as slurry treatments on pea, bean and cucumber seeds at E. Lansing, Michigan. Organic fungicide-insecticide compounds gave best control of seed and seedling parasites on peas and beans, whereas mercury compounds were best for cucumbers. Insecticides gave no significant protection when used without fungicides, and several proved injurious. [See also *H.A.*, 27: 467.]

2446. Hagedorn, D. J.
Field and laboratory tests of seed protectants for canning peas.
Phytopathology, 1957, **47**: 70-2, bibl. 2.

Between 1949 and 1953 various chemicals were compared as protectants against damping-off (*Pythium* spp.) using several rapid testing techniques in comparison with field tests. Rolled towel and cold-chamber methods appeared to give more precise results than greenhouse temperature tank tests, but all three methods proved useful. Among seed protectants the best were KF467, Phygon and Orthocide 75. Spergon, the compound most widely used commercially, gave variable, and sometimes poor, results.—Wis. agric. Exp. Stat., Madison.

2447. Reiling, T. P., and King, T. H.
Correlation between pea root rot in commercial fields with greenhouse determinations of soil infestation.
From abstr. in *Phytopathology*, 1957, **47**: 28.

Highly significant correlation coefficients were obtained. Results indicated that yield is inversely related to the amount of root rot present in the field. A reliable method has been developed for selecting fields suitable for growing canning peas, so far as root rot is concerned.

2448. Barros, O., Cardenosa, R., and Skiles, R. L.
The severity and control of angular leaf spot of beans in Colombia.
From abstr. in *Phytopathology*, 1957, **47**: 3.

Angular leaf spot of Pinto beans, practically unknown in the Cauca Valley before 1954, has now become severe. In fungicide tests in 1955, untreated plots of 3 varieties yielded only 68–80% of those treated with zineb. Several highly resistant native and foreign varieties have been found, and breeding for resistance has been started.

2449. Nour, M. A.
Control of powdery mildew diseases in the Sudan, with special reference to broad beans.
Emp. J. exp. Agric., 1957, **25**: 119-31, bibl. 16.

In the Sudan broad beans are subject to attack by *Erysiphe umbelliferarum*, *E. polygoni* and *Leveillula taurica*. Other crops attacked by one or more of these powdery mildews or by *Erysiphe cichoracearum* or *Sphaerotheca fuliginea* include carrots, several cucurbits, okra, sesame and safflower. Fungicide trials on okras and vegetable marrows in one year and on broad beans in 3 years showed that lime-sulphur, water dispersible sulphur, sulphur dust and thiram were generally effective against the powdery mildews, but that at the higher and more effective concentrations they were apt to be phytotoxic. For broad beans sulphur dusts were particularly effective, but were irritant to the eyes. At two centres early sowing of broad beans combined with lime-sulphur sprays applied at low concentration resulted in considerably increased yields.—Fac. Agric., Univ. Coll. Khartoum.

2450. Crossan, D. F., and others.
Control of downy mildew of lima bean.
Plant Dis. Reptr, 1957, **41**: 156-9, bibl. 8.

Two applications of maneb on lima beans within a month of harvest, when downy mildew was present or forecast, gave excellent control of the disease. Tank-mix zineb or tri-basic copper sulfate also gave adequate disease control. Streptomycin plus copper or glycerin was not so satisfactory for control as the other materials tested. Three bean lines, developed by the United States Department of Agriculture, were evaluated under severe disease conditions and found to be highly resistant to infection by *Phytophthora phaseoli* Thaxt. [Authors' abstract.]—Del. agric. Exp. Stat.

2451. Burke, D. W., Gomes, J. C., and Foeppel, W. G.
Observations on sclerotinia wilt of beans in northeastern Colorado.
Plant Dis. Reptr, 1957, **41**: 72-3, bibl. 3.

It is suggested that the increase in sclerotinia wilt of beans (*Sclerotinia sclerotiorum*) in northeastern Colorado may be reduced by planting only one crop of beans in rotation with alfalfa.—U.S.D.A. agric. Res. Serv., Prosser, Wash.

2452. Conover, R. A.
Control of pole bean rust with maneb-sulfur dust.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 247-50.

Control of rust (caused by *Uromyces phaseoli typica*) by sulphur dusts was improved by the addition of 7% maneb. When rust is severe applications should be made twice weekly before the beans start to set and every 5 days thereafter.—Sub-trop. Exp. Stat., Homestead, Fla.

2453. Meier, W.
Untersuchungen an der Erbsenblattlaus (*Acyrthosiphon pisum* Harris). (**Studies on pea aphid.**)
Mitt. schweiz. Landw., 1956, **4**: 40-8, bibl. 1.

Factors affecting the occurrence of pea aphid have been studied in the field. Peas sown in mid-April suffered seriously from pea aphid attack while those sown earlier or later were less severely attacked. Varietal resistance was investigated. Chemicals used successfully for aphid control were parathion, malathion, isolan and nicotine. These materials were also shown to reduce the population of beneficial syrphid larvae.

2454. Ziegler, H.
Über die physiologischen Grundlagen der Wirkung des Insektizids E 605 auf den pflanzlichen Organismus. (**The physiological basis of the effect of the insecticide E 605 on the plant organism.**)
Biol. Zbl., 1957, **76**: 43-69, bibl. 73, illus.

The nitrogen metabolism of young pea plants was only indirectly affected by E 605, probably as a result of disturbances in the translocation processes. The rate of transpiration of young pea and tomato plants was temporarily reduced after spraying with E 605.—Bot. Inst., Univ. Greifswald.

2455. LILLY, J. H., AND FAHEY, J. E.
Translocation of BHC from high-dosage soil treatments applied before planting.
J. econ. Ent., 1956, **49**: 815-18, bibl. 5.

Soil applications of 50 lb./ac. of lindane in 1952 resulted in low but definite amounts of BHC in the seeds of bean and other crops the year of treatment and in the following 3 growing seasons. Some of the crops grown in 1955 on plots treated just before planting with lindane or the gamma isomer of BHC at 10 lb./ac. also showed small amounts of insecticide in the seed. This confirms earlier reports that plants can translocate these insecticides. However, in view of the excessive dosages used and the minute amount of insecticide recovered from the plant samples, there seems little possibility that translocation will cause residues anywhere near the official tolerance of 10 p.p.m. for lindane and 5 p.p.m. for BHC deemed safe to man on fruit and vegetables.—Iowa St. Coll., and Agric. Res. Serv., U.S.D.A.

2456. LOOSJES, F. E.
De bestrijding van de stambonekever, *Acanthoscelides obtectus* Say, in opgeslagen voorraden. (**The control of bean seed weevil in stored beans.**) [English summary 7 lines.]
Jaarb. PlZiekt. Dienst, Wageningen, 1955, 1956, pp. 163-6.

Fumigation with methallyl chloride, hydrocyanic acid or methyl bromide gave good control of the weevils at the concentrations tested, but all materials gave the beans a disagreeable flavour after cooking. Bean germination was severely affected by hydrocyanic acid, but only slightly affected by the other materials.

Mushrooms and other edible fungi.

2457. LAMBERT, E. B., AND AYERS, T. T.
Thermal death times for some pests of cultivated mushroom (*Agaricus campestris* L.)
Plant Dis. Reptr, 1957, **41**: 348-53, bibl. 23.

Cultures of 9 fungus diseases of mushrooms were exposed to moist heat for various periods. All those tested except *Papulaspora byssina*, *Chaetomium* spp. and *Diehliomyces microspora* were killed by exposure to 130° F. for 16 hrs, 140° for 6 hrs or 150° for 4 hrs. These treatments were not always successful under dry conditions. The results are compared with those of other workers on various mushroom pests and diseases. It is recommended that under practical conditions the length of the heating period should be increased to ensure against the presence of resistant strains of fungus.—Plant Indust. Stat., Beltsville, Md.

2458. PEGLION, V.
Nel bosco della Panfilia. Origine e decadenza del maggiore centro tartufifero d'Italia. (**In the Panfilia woods. Origin and decline of the largest truffle-producing centre in Italy.**)
Ital. agric., 1957, **94**: 3-8, bibl. 1.

Blackthorn (*Prunus spinosa*) favours early development of truffles, abundant in woods periodically flooded by the river Reno. Disturbance of the soil or exposure of the immature truffles checks further development and may destroy them, probably because of the delicate nature of the hyphal connections between the truffles and oaks, blackthorns, etc., with which they appear to form mycorrhiza. Flood-prevention measures will almost certainly bring gradual extinction to the already reduced truffle harvesting.

2459. PEGLION, V.
Tartuficoltura e rimboschimento. (**Truffle growing and reafforestation.**)
Ital. agric., 1957, **94**: 207-16, illus.

An experimental black truffle wood of *Quercus pedunculata*, *Q. sessiliflora* and *Q. ilex* near Spoleto became productive in its 6th year. Production of white, black and other truffles in natural and planted woodlands in various districts of Italy is described. Other symbionts beside oaks are poplars, willows and occasionally limes.

Onions and allied crops.

(*See also* 2383, 2387, 2556m, 2557m, n, s.)

2460. PARIBOK, T. A.
Bulb formation in onions in artificial light. [Russian.]
Agrobiologija, 1956, No. 6, pp. 126-8.

Bulb formation in onions grown from both seed and sets was rapid under incandescent lamps while under luminescent lamps it was poor or non-existent. Luminescent light induced vigorous vegetative growth resulting in a mass, i.e. 25–47, of green leaves.

2461. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Diseases of onions, leeks and shallots.
Adv. Leafl. Dep. Agric. Scotland **27**, 1957, pp. 10, illus., 1s. 6d.

Diseases discussed are smut (*Urocystis cepulae*), white rot (*Sclerotium cepivorum*), downy mildew (*Peronospora destructor*), neck rot (*Botrytis* spp.), shallot virus yellows, white tip of leek (*Phytophthora porri*) and leek rust (*Puccinia porri*).

2462. BESEMER, A. F. H., AND VAN DE VLIET, M.
Bestrijding van de uievlieg, *Chortophila antiqua* Mg. door een zaadbehandeling met gechloreerde koolwaterstoffen. (**Control of the onion fly by seed treatment with chlorinated hydrocarbons.**) [English summary ½ p.]
Jaarb. PlZiekt. Dienst, Wageningen, 1955, 1956, pp. 172-6.

Treatment of onion seed against onion fly with DDT plus a sticker has often inhibited seed germination. Heptachlor and chlordane treatments also inhibited germination. In field trials results with aldrin were promising for onion fly control. Dieldrin could be used as a seed treatment without a sticker thus avoiding the unfavourable effect of the sticker on germination. Improved emergence and growth was obtained by applying TMTD with the insecticidal dressing.

2463. CARDEN, P. W.
Dieldrin helps seed germination too.
Grower, 1957, **47**: 612-14, illus.

Three insecticides were tested as substitutes for calomel in seed-dressing trials against onion fly in Bedfordshire. In 2 years' trials DDT seriously reduced germination and gave only partial control of onion fly. Both aldrin and dieldrin gave excellent control of fly. Aldrin reduced germination but dieldrin improved it slightly; the latter is therefore recommended for commercial use. All rates of dieldrin used increased yields to at least 2½ times those of the untreated controls.

2464. Bruinsma, F.
Warme bewaring van plantsjalotten. **(Warm storage of shallots.)** [English summary ¾ p.]
Meded. Proefst. Groent. Volle Grond, Alkmaar **5**, 1957, pp. 39, bibl. 3, illus.

Shallots (variety Noordhollandse Strogele) were stored at a temperature varying from 25·5 to 28° C. for various periods, followed by storage at 1–10° C. before planting out. Flower formation was inhibited by warm storage of 11–12 weeks. The number of offsets produced was increased by warm storage, the maximum number being formed after about 3 months' storage. Yields were markedly increased by warm storage, in 1955 treatment for 3 months resulting in a yield increase of 70–80%. A positive correlation was found between offset number and yield; in general yields increased more than offset number. The development and ripening of newly-formed offset was retarded by warm storage, the effect increasing with time. Longer warm storage increased leaf growth, but leaves made soft growth after 3 months' treatment. Leaf colour was sometimes affected by warm storage especially after longer storage periods, so that selection for virus was complicated.

Root crops.

(*See also* 2034, 2050, 2059, 2088j, 2383, 2387, 2392, 2556j, k, q, 2557u.)

2465. Beneš, V.
Korelace mezi počátkem květu semenic a výnosem kořenů u kořenových zelenin. **(Correlation between the time of flowering of seed plants and yield of root vegetables.)** [English, Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 1141-6, bibl. 3.

In the main types of root vegetables, i.e. carrot, parsnip, parsley, celeriac and beetroot, the time required from planting out to flowering of the mother plants was found to be negatively correlated with the yield of the progeny. This correlation was greatest in the case of parsley (r=−0·903±0·044) and smallest, scarcely significant, in that of celeriac (r=−0·198±0·233).

2466. Eifrig, H.
Neuere Beobachtungen bei der Keimprüfung verschiedener landwirstchaftlicher und Gemüsesämereien. **(New observations on germination tests with various agricultural and vegetable seeds.)**
Sonderh. Landw. Forsch. **9**, 1957, pp. 134-9, bibl. 5.

Germination of beet seed was best after soaking between filter paper for 15 hours. The recommended treatments for radish seed, which should be germinated soon after harvest, are a constant temperature of 15–17° C. or alternating temperatures of 10 and 30° C. For lettuce seed 3 days' cooling at 8–12° C., followed by a constant temperature of 20° C., was most satisfactory.

2467. Dekker, J.
Ontsmetting van bietezaad met antibiotica. **(Disinfection of beet seed with antibiotics.)**
Tijdschr. PlZiekt., 1957, **63**: 25.

Soaking beet seed in a solution of "antibioticum P" [unnamed] has reduced the occurrence of *Phoma betae* from 60–80% to 1%, while with Panogen it was reduced to 11%. In further tests the antibiotics were suspended in methanol 50%, and 60 c.c. of a 1% suspension per kg. seed reduced *Phoma* from 70% to 0–4%.

2468. Ležankina, Z. S.
The effect of ridging on carrot yields in the humid zone. [Russian.]
Zemledelie, 1956, **4**(11): 101-5.

Experiments at Puškin near Leningrad and at other places with ample precipitation and/or a high water table have shown that by growing carrots on the ridge soil moisture and temperature conditions can be improved with a consequent increase in yield. In general, on medium and heavy podzolic soils the best results were obtained on raised beds (140 cm. wide) and wide ridges (90 cm. wide), but on sandy loam soils sowing on the level gave the highest yields.

2469. Niemann, J.
Ein Beitrag zur Ernährung der Gartenmöhre unter besonderer Berücksichtigung des Wasserhaushaltes. **(A contribution to the nutrition of garden carrot, with particular reference to water relations.)**
Z. PflErnähr. Düng., 1955, **71**: 19-33, bibl. 21.

The effects of various forms of fertilizer and 3 water levels on carrots (variety Paris Market) were studied in pot experiments. When N was given as ammonium chloride the effect of K deficiency was more marked than with ammonium sulphate or calcium nitrate, in particular with poor water supply. High yields were obtained with potassium plus ammonium sulphates with or without sodium sulphate. Chloride ions appeared to reduce yields and quality, in particular with ammonium-N. The type of N applied was of particular importance when water supply was low and chlorides were also applied. "Ammonium plants" in general produced more leaf and dry matter than did "nitrate plants". Chloride ions favoured K and Ca uptake more than did sulphate ions, Ca uptake being affected to a greater degree than K. Carrots receiving sulphates and ammonium salts contained high levels of carotene, protein N, monosaccharides and total sugars; plants receiving chlorides had low levels of carotene, total sugars and monosaccharides, and fairly high levels of disaccharides. Chloride ions promoted disaccharide formation and inhibited protein synthesis. Unfavourable water relations resulted in reduced contents of relative protein N. With plants receiving an adequate K supply Na applications increased yields and promoted carotene and monosaccharide formation.—Bundesanst. Qualitätsforsch. pfl. Erzeug., Geisenheim.

2470. Atkin, J. D.
Bitter flavor in carrots. II. Progress report on field and storage experiments.
Bull. N.Y. St. agric. Exp. Stat. **774**, 1956, pp. 30, bibl. 18.

The results are given of a farm survey and field and storage experiments conducted during 1953–55 to find the cause of bitterness in carrots that have been in cold storage for a period after harvest. The survey showed that previous cropping, sowing time, the application of fertilizers, weedkillers and insecticides and the use of cover crops did not appear to affect the subsequent development of bitterness. Extensive variety trials indicated that there was very little difference in the susceptibility of strains and varieties, but there were extreme differences between individual roots indicating that genetic or micro-environmental factors might be operating. Carrots grown on the muck and sandy soils of the intensive vegetable growing areas were considerably more bitter after cold storage than those grown on upland loam soils of general farms. Experiments showed that drought or lack of Na were not responsible for bitterness. No carrots were bitter at harvest or after "common" storage, and it is concluded that bitterness is due to an interaction of environmental conditions before and during storage. [For part I, entitled A tentative spectrophotometric method for the estimation of bitterness, see *Food Res.*, 1955, **20**: 659-65.] J.R.L.

2471. Burgis, D. S., and Overman, A. J.
Crop production in soil fumigated with Crag Mylone as affected by rates, application methods and planting dates.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 207-10, illus.

When applied to carrots Crag Mylone gave a high degree of control of root-knot nematode for approximately 15 weeks after treatment at 100 lb. per acre. Soil residues 6 days after treatment were very low. No significant differences in final yield data could be correlated with rate, method of treatment, or time of sowing. The fumigant showed some toxicity to capsicum seedlings.—Gulf Coast Exp. Stat., Bradenton, Fla.

2472. Schreiber, H. A., Davis, L. E., and Overstreet, R.
Influence of certain adsorbed cations on radish seedling development.
Soil Sci., 1957, **83**: 91-9, bibl. 23.

One organic and 4 inorganic soils were treated to produce varying proportions of adsorbed Na, H and Mg to Ca. Radish seedling elongation in the Ca-Na system was a maximum for 10–20% of adsorbed Na; this was greater than for the control in sand. Elongation decreased with increasing adsorbed Na up to 80%, mainly owing to removal of Ca from the seedlings and not to the direct effects of Na. In Ca-H systems there was no stimulation at low percentages of H and in inorganic soils elongation decreased with the fall of Ca in the seedlings, being less in organic than in mineral soils with comparable Ca percentages. Results in Ca-Mg systems resembled in general those from Ca-Na and Ca-H systems.

2473. Cox, R. S., Carroll, V. J., and Benedict, R. A.
Studies on the etiology and control of the radish pit diseases.
From abstr. in *Phytopathology*, 1957, **47**: 7.

Evidence suggested that radish pit, a storage and transit disease of radishes, was of bacterial origin. Following 5-minute dip treatments with antibiotics, radishes were held in perforated cellophane bags at 10°, 15°, 20°, 25°, 30° and 35° C. After 5 days percentage infection at the above temperatures, respectively, were as follows: control 0, 47, 65, 100, 100, 10; 10 p.p.m. Terramycin, 0, 5, 8, 76, 90, 2; 20 p.p.m. Terramycin, 0, 1, 2, 21, 45, 5; 40 p.p.m. Terramycin, 0 at all 6 temperatures; 40 p.p.m. streptomycin sulphate (technical grade), 0, 36, 69, 85, 100, 4.

2474. Army, T. J., and Miller, E. V.
Relationships of the cation suite and yield of turnip greens for selected extremes of soils, fertilizers, and environment.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 176-82, bibl. 30.

Growth was closely associated with soil calcium status and soil temperature. Growth response to soil temperature differentials was affected by season. Cation content of the tops was markedly influenced by the exchangeable cation levels and by the predominating clay minerals of the respective soils. Sodium, the content of which tended to decrease in the tops with an increase in soil temperature, was the only macrocation materially affected by soil temperature. The K : Na ratio of plants was also dependent upon the soil temperature. Aerial environmental conditions, although not individually characterized, were shown to be of equal importance to soil factors in determining cation content of plants. The magnitude of seasonal effects on cation concentration in leaves, however, was influenced by type of clay mineral and the percent Ca and Mg saturation in the soil. The interrelationships of growth and macrocation content are discussed. [From authors' abstract.]—N.C. agric. Exp. Stat.

Salad crops.

(*See also* 2034, 2036, 2042, 2063, 2329, 2332, 2383, 2406, 2466, 2497, 2556b, p.)

2475. Mungomery, W. V.
Lettuce germination.
Qd agric. J., 1956, **82**: 683-6, illus.

The optimum temperature for germination is 75° F. At 95° F. lettuce seeds become dormant and may not germinate for some months; this can be prevented by storing moist seeds in a refrigerator or on ice for 3–5 days before sowing. J.R.L.

2476. Kahn, A., Goss, J. A., and Smith, D. E.
Effect of gibberellin on germination of lettuce seed.
Science, 1957, **125**: 645-6, bibl. 8.

Seed of lettuce, variety Grand Rapids, was treated with gibberellin (a mixture of gibberellin A and gibberellic acid) at various concentrations to determine whether the substance could replace light in the germination requirements. One lot of seed had a primary light requirement whereas the other lot had a secondary light requirement induced by pretreatment with high temperatures [see *H.A.*, 25: 631] or by the presence of an osmotically active material [see *H.A.*, 26: 3799]. It was found that gibberellin could substitute for red light in the promotion of germination. It replaced the primary light requirement and prevented or released the secondary light requirement. The effect of gibberellin was not reversed by a period of exposure to far red light that was sufficient to reverse the effect of red light.—Univ. Calif., Los Angeles.

2477. Harrington, J. F., Rappaport, L., and Hood, K. J.
Influence of gibberellins on stem elongation and flowering of endive.
Science, 1957, **125**: 601-2, bibl. 7, illus.

The interaction of vernalization and gibberellin on the growth and flowering of endive is described. Endive seeds were vernalized for 4 weeks, and then grown at a day temperature of 18° C., with supplementary illumination given after 2 months at this temperature; gibberellin applications to the stem apex were started at seedling emergence. Stem elongation was apparent on both vernalized and unvernalized plants 10 days after the first application of gibberellin. Twenty-one days later stems of untreated, vernalized plants began to elongate, while the growth of untreated, unvernalized plants remained as typically rosette. Repeated applications of gibberellin induced the greatest stem elongation. Repeated applications to vernalized plants induced a higher percentage of flower initials and earlier flowering than was induced by vernalization alone. All vernalized plants flowered but weekly applications of gibberellins also induced flowering in non-vernalized plants. A single application of gibberellin to vernalized plants induced stem elongation initially, followed by formation of rosette growth.—Univ. Calif., Davis.

2478. Rappaport, L., and Wittwer, S. H.
Night temperature and photoperiod effects on flowering of leaf lettuce.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 279-82, bibl. 11, illus.

Findings regarding the effect of photoperiodism and temperature emphasize the necessity for using only particular varieties of known reaction to these factors for cultivation in particular seasons and under particular conditions, e.g. glasshouse or in the open.—Univ. Calif., Davis, and East Lansing, Mich. [See also *H.A.*, 27: 502.]

2479. Hawthorn, L. R., and Pollard, L. H.
Production of lettuce seed as affected by soil moisture and fertility.
Bull. Utah agric. Exp. Stat. **386**, 1956, pp. 23, bibl. 15, illus.

Trials over 3 years, 1952 to 1954, show that under Utah conditions high soil moisture combined with a generous supply of nitrogen favours the highest lettuce seed yields. They are here described and the effects of varying moisture and varying amounts of fertilizer are considered in some detail. There was a slight tendency for seed yields to be higher in plots which received P_2O_5, but there was no other noticeable effect of P. The interaction of N and soil moisture was noticeable in 1952. Nitrogen was found then to be most effective in increasing seed yields with high soil moisture and least effective with low soil moisture.

2480. Hader, R. J., and others.
An investigation of some of the relationships between copper, iron, and molybdenum in the growth and nutrition of lettuce: I. Experimental design and statistical methods for characterizing the response surface. II. Response surfaces of growth and accumulations of Cu and Fe.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 59-64, bibl. 6; 65-74, bibl. 15.

Part I. New experimental designs, known as the composite and rotatable designs, are described, which have advantages over the complete factorial arrangement.

Part II. Solutions with varying concentrations of Cu, Fe and Mo were imposed on 4 series of treatments involving combinations of ferrous iron, ferric iron, all nitrate nitrogen, and ¼ ammonium plus ¾ nitrate nitrogen. The experiment was conducted using solution culture in a rotatable design. This design permitted calculations of response surfaces from a much smaller number of treatments than would have been necessary with complete factorials. All of the variables affected growth and accumulation of ions. Illustrations are given for some of the relationships which appear to exist among Cu, Mo, Fe, sources of N, and sources of Fe. Pronounced interactions were obtained between Cu and Fe. The growth of lettuce at any one level of Cu was affected by Fe supply. The reverse relationship was also observed. The Cu content of leaves was affected by Fe supply as was Fe content by Cu supply. The interaction between Cu and Fe on Cu content was affected by source of N and source of Fe. The effects of Cu and Mo on Fe content and the interactions between Cu and Mo, Cu and Fe, and between Fe and Mo were much more pronounced in the series containing all nitrate nitrogen. Curves of yield *vs.* Cu content of tops suggested that there is not any single level of Cu in the plant which represents an optimum level. The Cu content corresponding to maximum yield appeared to be influenced by levels of Fe and Mo in solution, source of Fe, and source of N. In general, form of nitrogen had a more pronounced effect on growth and accumulation than did the valence of Fe. Implications of the relationship suggested by this study and the use of response surfaces as an aid in studying nutrient interactions are discussed. [From authors' summary.]—N.C. agric Exp. Stat., Raleigh.

2481. Goodall, D. W., Slater, W. G., and Lipp, A. E. G.
Nutrient interactions and deficiency diagnosis in the lettuce. II. Effects of nutrition on water content.
Aust. J. biol. Sci., 1957, **10**: 57-65, bibl. 17.

In a sand-culture experiment with lettuces, the water content (as per cent. of dry matter) of the aerial portions was studied in plants subjected to 5 levels of N, P, and K supply in all combinations. The higher levels of N supply were found to decrease the water content, while increases in P supply had the reverse effect. Plants deficient in K had a higher water content than those receiving an adequate amount, unless P was also deficient. [Authors' summary.]—Bot. Sch., Univ. Melbourne. [For part I see *H.A.*, 26: 681.]

2482. Williams, D. E., and Vlamis, J.
Manganese toxicity in standard culture solutions.
Plant and Soil, 1957, **8**: 183-93, bibl. 4, illus.

The oldest leaves of lettuce grown in Hoagland solution developed spots when Mn was present at 0·5 p.p.m. and showed severe marginal burn with necrotic areas between veins when B was present at the same concentration. Addition of sodium silicate to the solution prevented the spots from appearing, but did not reduce burn symptoms. Tomato plants were not visibly affected by this concentration of B or Mn. Yields of both lettuce and tomato were markedly reduced when Mn concentration was decreased to 0·01 p.p.m.

2483. Hey, G. L., Hunnam, D., and Gathercole, J. A.
Griseofulvin increases profit from lettuce.
Grower, 1957, **47**: 1177-81, 1182, illus.

Trials on botrytis control on winter lettuce in glasshouses were carried out using 3% griseofulvin dust mainly. The dust was applied to the seedlings before and/or after planting out. In general treatment after planting out gave better results than treatment before planting out, but the most effective treatments combined both, and reduced botrytis infection by 40–50%.—Murphy Chem. Co., Wheathampstead, Herts.

2484. Brants, D. H.
Sclerotinia minor (Jagger) op sla. (***Sclerotinia minor* on lettuce.)**
Tijdschr. PlZiekt., 1957, **63**: 22-3.

The fungus entered the plant by wounds in the leaf tissue. Sclerotia were killed by formalin, and heat treatment (70° C.) was also effective.

2485. Besemer, A. F. H.
Enige proeven met chemische middelen ter bestrijding van *Sclerotinia minor* Jagger in sla. (**Some trials on chemical control of *Sclerotinia minor* in lettuce.**) [English summary ½ p.]
Jaarb. PlZiekt. Dienst, Wageningen, 1955, 1956, pp. 161-2.

TMTD has been used recently for control of *Botrytis* in lettuce, but it gives no control of *Sclerotinia minor*. PCNB has previously controlled *Sclerotinia* but growth has been retarded. Soil treatment with Brassicol super followed by spraying the crop with Hoe 2652 (both materials based on PCNB) gave good control of *Sclerotinia*, and when carefully applied did not retard growth.

2486. Parsons, C. S., and Wright, R. C.
Effects of temperature, trimming and packaging methods on lettuce deterioration.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 283-7, bibl. 8.

A storage temperature of 32° F. proved much better than one of 38° for Great Lakes head lettuce. Lettuce trimmed in the field generally kept better than that trimmed at market or than that untrimmed. Lettuce in polythene-lined cartons or individually wrapped in polythene or cellophane tended to remain greener and more turgid than that stored unwrapped or in unlined cartons.—U.S.D.A., Beltsville, Md.

2487. Stewart, J. K.
Precooling and transit tests with lettuce.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 288-95, bibl. 7.

Tests are reported on the transport of lettuce packed in cartons in 10 fan-cooled and 1 vacuum-cooled refrigerator cars. The average temperature reduction of lettuce during fan precooling was 1·5° F. per hour. In 3 out of the 4 fan-precooled cars which contained recording thermometers temperatures below 40° were indicated after the first day in transit. Adequate spacing of cartons increased precooling efficiency.—Univ. Ariz., Tucson.

2488. Rood, P.
Relation of ethylene and post-harvest temperature to brown spot of lettuce.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 296-303, bibl. 11, illus.

A disorder of head lettuce occurring as small brown spots on both sides of the midribs, and in severe cases on the leaf blades, was produced by low concentrations of ethylene in the storage atmosphere. The injury from either ethylene gas or apple volatiles was most severe if the lettuce temperature during the ten days after harvest was about 44° F. Less injury occurred with either higher or lower post-harvest temperatures, and very little injury occurred at 32°. The ethylene fraction of apple volatiles was primarily responsible for the injury to lettuce stored with apples. Lettuce harvested when fairly firm is less susceptible to ethylene injury than firm or hard lettuce. [Author's summary.]—U.S.D.A., Fresno, Calif.

2489. Hartman, T. A.
After-effects of low temperature on leaf morphology of *Cichorium intybus* L.
Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1956, **59**: 677-84, bibl. 8.

Cold treatment of germinating seed or plants of chicory induced leaves which differed from control plants by being longer, thinner and more deeply-lobed with more acute tips and a more hairy lower epidermis.—Lab. Tuinbouwpl., Wageningen.

2490. Spice, H. R.
Watercress grown under plastic film.
Grower, 1957, **47**: 753-5, illus.

Good results have been obtained on a commercial scale by covering the beds with a thin plastic film fixed on to wooden frames. The drop in temperature of the water was considerably reduced by the covering and the cress made more rapid growth. Slightly higher prices were consistently obtained for the covered cress.

Spinach.

(*See also* 2556v.)

2491. Zoschke, U.
Untersuchungen über die Bestimmung des Geschlechts beim Spinat (*Spinacia oleracea* L.) unter besonderer Berücksichtigung der Züchtung eines monözischen oder gleichzeitig schossenden Spinates. (**Studies on sex determination in spinach, with special reference to the breeding of monoecious spinach or of a variety with simultaneous seed stalk development.**)
Z. Pflanzenz., 1956, **35**: 257-96, bibl. 59, illus.

Spinacea oleracea is a dioecious species, the male plants of which develop their seed stalks about 10 days earlier than the females. This characteristic is inconvenient to the grower as it shortens the harvesting period. In addition to strictly dioecious plants, there are plants with a small percentage of monoecious and intermediate flowers, and from these the author developed the variety "Gleichzeitig schossend" (Flowering simultaneously) which is largely composed of "feminized" monoecious and female plants. In its initial stages of development yields of the new variety were already equal or superior to the best dioecious varieties. The bulk of the paper is devoted to genetical work on sex determination in spinach.—Inst. PflZücht. Martin-Luther Univ., Halle-Wittenberg.

2492. Lange, W. H., Grigarick, A. A., and Carlson, E. C.
Serpentine leaf miner damage.
Calif. Agric., 1957, **11**(3): 3-5, illus.

Liriomyza langei, which is described, has recently done serious damage to autumn spinach in the Salinas Valley despite the use of insecticides. Suggestions are made for modifying the spray programme to avoid deleterious effects on the parasites which normally keep leaf-miner infestations in check.

Tomatoes, capsicums and eggplants.

(*See also* 2014, 2034, 2043, 2056, 2063, 2080, 2088m, 2328, 2383, 2386, 2402, 2454, 2471, 2482, 2556b-d, f, p, r-t, w, z, 2557b, d, f, h, i, p, v, 2831.)

2493. Ministry of Agriculture, London.
Tomatoes.
Bull. Minist. Agric. Lond. **77**, 4th edition 1956, pp. 72, illus., 4s. 6d.

Since the publication of the previous edition in 1950 [see *H.A.*, 21: 654], research findings and commercial experience have made it necessary for this fourth edition to be largely rewritten. Manuring of the crop has received much greater attention, and information on the artificial illumination of seedlings and the use of first-cross hybrids is included. There are also new sections on the production of tomatoes in cold houses and Dutch light structures, on seed saving and on grading and marketing the crop. The chapter on pests and diseases is brought up to date.

2494. Ohova, E. P.
Changes in tomatoes through vegetative hybridization. [Russian.]
Agrobiologija, 1956, No. 5, pp. 70-6, illus. .

An account is given of work primarily designed to produce tomato plants resistant to broomrape. From the seed of a fruit produced by an eggplant-on-tomato graft a new form of tomato, tomato × eggplant hybrid 77a, was obtained. The new form was found to be vigorous, productive and resistant to diseases and broomrape. Its morphology and genetics are discussed.

2495. Solov'eva, N. A.
Distant hybridization in the family of Solanaceae. [Russian.]
Agrobiologija, 1956, No. 6, pp. 91-6.

Results are given of vegetative and/or sexual hybridization between tomato varieties and *Solanum muricatum*, *Cyphomandra*, *Lycopersicum hirsutum* amd *L. peruvianum*. The work was undertaken to develop economically valuable tomatoes with good keeping quality and high disease resistance.

2496. Duclos, M.
Note sur l'aquiculture de la tomate en zone équatoriale (région de Yangambi). (**Note on hydroponic culture of tomatoes in the equatorial zone, Yangambi district.**) [Flemish summary 1¾ pp.]
Bull. agric. Congo belge, 1957, **48**: 51-65, illus.

The nutrient solution, which is supplied by sub-irrigation of coarse gravel in metal tanks, is circulated, aerated for ½ hr daily and drawn off at night. Protection from heavy rain is given by glass roofs supported on concrete poles based on a low wall. In addition to N, P, K, Ca and Mg the solution includes Fe, Mn, Cu, B, Zn and Mo. Planting and cultural practices are described, including attempts to control blossom-end rot. Economic aspects are discussed.

2497. Morris, L. G., Neale, F. E., and Postlethwaite, J. D.
The transpiration of glasshouse crops, and its relationship to the incoming solar radiation. [French, German and Spanish summaries 10-11 lines each.]
J. agric. Engng Res., 1957, **2**: 111-22, bibl. 8, illus.

Measurements of the transpiration per unit plan area of tomatoes, lettuces and carnations showed that the daily transpiration depends markedly on radiation. Detailed measurements were carried out on tomatoes and carnations over 2-day periods, and it was shown that the close relationship between transpiration and radiation was apparent in periods as short as 1 hour.—Nat. Inst. agric. Engng, Silsoe, Beds.

2498. Gäumann, E., and Loeffler, W.
Über die Wirkung von Fusarinsäure auf die Wasserpermeabilität der Markzellen von Tomatenpflanzen. (**The action of fusaric acid on the water permeability of medullary cells of tomato plants.**) [English summary ⅔ p.]
Phytopath. Z., 1957, **28**: 319-28, bibl. 11.

The effect of increasing concentrations of fusaric acid on the water permeability of pith cells of tomato shoots was studied. Changes in permeability became apparent at concentrations between 5×10^{-8} and 10^{-7} molar. Concentrations up to 5×10^{-7} molar caused an increase in water permeability up to 1½ times its initial value. At higher concentrations water permeability was reduced and above 10^{-5} molar it became less than that of normal cells.—Eidg. tech. Hochsch., Zürich.

2499. Flerov, A. F., and Flerov, V. A.
The substitution of a removed main shoot by cotyledonary axillary shoots. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **111**: 713-16, bibl. 11, illus.

The main shoots of tomato and bean plants cut off above the cotyledonary node during different stages of development were replaced by shoots arising from cotyledonary axillary buds.

2500. Verkerk, K.
The pollination of tomatoes.
Neth. J. agric. Sci., 1957, **5**: 37-54, bibl. 16.

Studies were carried out on the effect of pollination on fruit set, normal fruit growth, earliness of yield and size of fruit. A high positive correlation was found between the number of seeds per fruit and the fruit weight. When flowers were pollinated with a mixture of inert powder and pollen, fruits were larger and earlier as the proportion of pollen in the mixture was increased. Heavier pollination resulted in larger, earlier fruits with more seeds. A negative correlation was found between fruit weight per seed and number of seeds on the plant when seed growth began. Good pollination was obtained by using an electric vibrator, resulting in earlier ripening and better quality fruits. Auxin sprays increased the number of large fruits containing few seeds. Under poor light conditions extra lighting improved the production of normal flowers.—Lab. Tuinbouwpl., Wageningen.

2501. Orel, L. I.
The effect of pollen age on fertilization and embryogenesis in tomatoes. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(1): 11-14, bibl. 10.

Pollen collected from the tomato varieties Bison and *Lycopersicon esculentum* spp. *subspontaneum* var. *cerasiforme* was used immediately, and, after 5–6 and 9–10 days' storage at 20–24° C., for the pollination of 2 other varieties. Fruit set in the case of the first pollinator was: fresh pollen 50%, 5–6 days' storage 45% and 9–10 days' storage 13·1%. Comparative figures for the second pollinator were 51, 1·5 and 0%. The average number of seeds per fruit also diminished progressively with the age of the pollen. Differences in the development of the embryos are described.

2502. Ajzenštat, Ja. S., and Šipilova, I. I.
Characteristics of pollen germination in tomato and pea flowers of different ages. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(3): 29-32, bibl. 4.

Pollen germination on the stigmas of newly opened tomato flowers was comparatively low, reached its maximum on 3–4-day-old flowers and was still good on 7–8-day-old flowers. On flowers more than 8-days-old pollen germination was very low. The highest percentage of fruit set resulted from pollination of 3–4-day-old flowers. With pea, pollen germination was good on the day the flowers opened and remained so for 6–7 days.

2503. Samsonova, I. A.
The use of the labelled atom method for studying the effect of vegetative hybridization. [Russian.]
Agrobiologija, 1956, No. 6, pp. 55-8, bibl. 10.

Experiments with pollen containing P^{32} have shown that cross pollination between tomato and *Solanum nigrum* was more successful when one of the components had previously been grafted on the other component.

2504. Ward, K. M.
Temperature and fruit set in the tomato.
Qd agric. J., 1956, **82**: 641-4, illus.

At temperatures below 50° F. the processes of fruit setting are considerably slowed down. The set of fruit on plants grown in the winter months can be increased if (a) suitable varieties are used, e.g. Salad's Special, Prosperity and several new crosses, using these as parents, (b) hormone sprays of betanaphthoxyacetic acid are applied, and (c) permanent or temporary windbreaks are planted. J.R.L.

2505. Fröhlich, H., and Spender, B.
Verbesserung des Fruchtansatzes bei der frühen Tomatentreiberei. **(Methods of improving fruit set in glasshouse tomatoes.)** [Russian and English summaries 8 lines each.]
Arch. Gartenb., 1956, **4**: 354-69, bibl. 17, illus.

Shaking flower trusses of glasshouse tomatoes markedly increased early yields as a result of improved pollination, but spraying with growth substances proved superior to the manual treatment. Parthenocarpy had no detrimental influence on flavour.—Inst. f. Gartenb. Grossbeeren.

2506. Davison, R. M.
Trials of fruit-setting sprays on glasshouse tomatoes.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 544-7, bibl. 5.

In tests with various fruit-setting sprays on tomatoes grown in unheated glasshouses in Auckland during 1950 and 1952, betanaphthoxyacetic acid, parachlorophenoxyacetic acid and certain commercial formulations increased yields and mean fruit weights on early crops which developed under adverse weather conditions. Sprays of betanaphthoxypropionic acid at 5 and 10 p.p.m., and one commercial formulation were unsatisfactory. Compared with checks most treatments gave heavier early pickings. Quality of fruit set by effective treatments was good in spite of some slight hollowing. [Author's summary.]—Fruit Res. Stat., D.S.I.R., Auckland.

2507. Jakuškina, N. I., and Kravcova, B. E.
The effect of growth stimulators on the yield and quality of the fruit of certain vegetables. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(2): 15-17, bibl. 9, illus.

Tomatoes, eggplants and peppers were sprayed with 2,4-D at 10 mg./l. during flowering. The treatment resulted in increased yield and dry matter, sugar and vitamin C contents in tomatoes; increased yield and fruit size, parthenocarpy and some fruit deformation in eggplants; and increased yield and sugar content but slightly reduced vitamin C content and some fruit deformation in peppers.

2508. Chattopadhaya, S. K.
Results of further investigations on the effect of hormones on setting of fruits and induction of seedlessness.
Sci. and Cult., 1956, **22**: 334-6, bibl. 7.

Newly opened and mature tomato flowers were dusted with 20% and 100% TCP (trichlorophenoxyacetic acid) and 2,4-D, without emasculation or bagging. Fruit set was increased in older flowers by TCP at both concentrations and in young flowers by 20% 2,4-D. All treatments markedly decreased size and weight of fruit from young flowers, but TCP slightly increased and 2,4-D at 20% decreased size and weight of fruit from older flowers. Examination of fruit from young flowers showed that effectiveness in reducing seed production was high with 20% 2,4-D, low with 20% TCP and intermediate with 100% TCP and 100% 2,4-D. [For earlier work see *J. Indian bot. Soc.*, 1954, Vol. **33**, No. 1/2.]

2509. Jensen, J.
Forsøg med beskaering og opbinding af frilandstomater. 1945-48 og 1952-55. **(Experiments on pruning and staking tomatoes in the field, 1945-48 and 1952-55.)** [English summary 1 p.]
Tidsskr. Planteavl, 1957, **61**: 35-48, bibl. 2.

The 6 treatments compared ranged from one stem, staked and stopped after the 4th truss, to three stems stopped after a total of 6–9 trusses and not staked. Highest yields of perfect, ripe fruits (272 kg. per 100 square metres) were obtained from staked plants with two stems stopped after a total of 7 trusses, which was an improvement of 23% over the usual method of training tomatoes in Denmark, viz. one stem, staked and stopped after the 4th truss. Plants grown as bush tomatoes until 1 August cropped satisfactorily, but fruit size was small and ripening rather late. In a comparison of all staked and unstaked treatments the latter produced 20% less perfect, ripe fruits, but the crop was a little earlier. The experiments were carried out at Virum, Blangstedgaard and Spangsbjerg Research Stations.

2510. Lamm, R.
Avstånds- och beskärningsförsök med drivtomat 1951-1953. **(Spacing and pruning trials with glasshouse tomatoes 1951-1953.)** [English and Esperanto summaries ½ p. each.]
Meddel. Tradgardsfors. Alnarp **100**, 1956, pp. 15, bibl. 11, illus.

Three planting distances and three degrees of pruning were compared on the tomato variety Potentate at Alnarp. No marked interaction was apparent between effects of spacing and pruning. In studies of the average results of the trials, normal pruning and a spacing of 4 plants/sq. m. were taken as standards. Early and total marketable yields and total yields were increased by closer spacing and decreased by wider spacing. The early marketable yield was significantly decreased by pruning the side-shoots to 1 leaf. Hard leaf pruning induced significant decreases in total yields. At wider spacing there was a slight increase in grooved and spotted fruits, but fruits were smaller at close spacing.

2511. Kozová, J.
Výskyt a fixační schopnost azotobaktera v rhizosféře rajčat. **(Occurrence and fixation capacity of azotobacter in the rhizosphere of tomatoes.)**
Sborn čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 966-9, bibl. 7.

Results of pot and field experiments with 2 tomato varieties showed that inoculation with azotobacter resulted in a vast increase of azotobacter in the rhizosphere, though the amount varied greatly with the 2 varieties. In the rhizosphere of the untreated controls of one variety no azotobacter was found and the same variety showed the smaller amount on inoculation. With the other variety the N fixation capacity of azotobacter in the rhizosphere of inoculated plants was considerably higher than in that of the controls.

2512. Emmert, E. M.
The black 'wonder' mulch.
Amer. Veg. Gr, 1957, **5**(4): 14, 52-3, illus.

Beans and tomatoes were produced 10 to 14 days earlier by using black plastic sheeting as a mulch. Profits obtained more than covered costs. Beans and tomatoes did even better under the mulch in the second year than under freshly laid plastic.—Univ. Ky.

2513. Hoffman, I. C.
Mulching greenhouse crops.
Amer. Veg. Gr, 1957, **5**(4): 36, illus.

Tomato plants mulched with strawy cattle manure or leguminous crops gave up to 20% higher yields than plants in unmulched plots. Low nutrient levels in the leaves and a deterioration in fruit quality toward the end of the season indicated that chemical fertilizers were also required by the plants.

2514. Lent, J. M.
Poultry manure as a mulch on tomatoes.
Res. Progr. Rep. Storrs agric. Exp. Stat. **13**, [1957], pp. 4, bibl. 20.

In a 2-year trial a 3-in. layer of poultry manure was applied at 30 tons per acre, with and without an inch sawdust cover, before planting. Tomato plants were set directly through the mulch. The results during the first year, 1954, were satisfactory, and during the second year, 1955, when weather conditions were unusual, very promising. In 1955 yields from the mulched plots were significantly higher than from the control plots, there being no difference between the manure and manure plus sawdust mulches.

2515. Lüders, R.
Über den Einfluss steigender NPK-Düngung auf den Phosphorsäure- und Schwermetallgehalt von Buschtomaten. **(The effect of increased NPK manuring on the phosphoric acid and heavy metal contents of bush tomatoes.)**
Z. PflErnähr. Düng., 1955, **70**: 65-70, bibl. 3.

The effects of 3 levels of NPK applications on the contents of P_2O_5, Fe, Cu and Zn in bush tomato fruits were studied during the picking period. The P_2O_5 content was highest in the first pick at the lowest NPK level. In later harvests P_2O_5 content decreased as NPK increased at all levels of NPK manuring. Iron and Zn contents increased with NPK levels during the first 3 picks, but decreased at the fourth pick. Copper showed a slight increase with increased NPK manuring at the first pick, but dropped later, the difference being particularly marked at the highest level of NPK manuring.—Lab. Erdbereitung, Hamburg.

2516. Ozanne, P. G., Woolley, J. T., and Broyer, T. C.
Chlorine and bromine in the nutrition of higher plants.
Aust. J. biol. Sci., 1957, **10**: 66-79, bibl. 9, illus.

Plants were cultured in purified inorganic salt solutions and with filtered glass-house air to reduce contamination by Cl. Leaf and top yields of tomato and clover respectively were reduced by over 80% when insufficient Cl was supplied. Supplying Br in place of Cl gave yields to 75–95% of the yields with Cl. However, plants receiving Br always extracted more Cl from their environment. In some instances, five times as much Cl appeared in plants treated with Br as in no-Br controls. In all cases the yields with Br applications were less than those with applied Cl. Br does not appear to completely substitute for Cl in growth and development of plants, as evidenced by weight and wilt differences. Part of the apparent effect of Br was due to Cl arising from extraneous contamination, e.g. the atmosphere. When plants were given ample Cl, no yield differences were obtained by additions of Br. Without added halide, foliar concentrations of Cl were as low as 1·0 μg-atom/g. dry weight for tomatoes, and 0·8 μg-atom/g. for clover. With ample Br supplied, these values fell only to 0·7 and 0·6 respectively. Large decreases in tomato yields were found when leaf Cl concentrations fell below 2·0 μg-atoms/g. dry weight. The addition of Br to roots of intact plants in a minus-Cl culture solution caused loss of Cl from the roots. Similarly, with decapitated plants, Cl was found to be displaced, moving upwards in the exuding sap. It is inferred that the effect of Br supplied to Cl-deficient plants is due to displacement of the Cl differentially from non-effective places to more essential loci. [Authors' summary.]—W. Aust. reg. Lab., Nedlands, and Univ. Calif., Berkeley.

2517. Marx, T., and Sahm, U.
Über den Einfluss von Mangan- und Bordüngungen auf den l-Ascorbinsäuregehalt der Tomaten. II. Mitteilung. **(The effect of manganese and boron applications on the l-ascorbic acid content of tomatoes. Part II.)**
Z. PflErnähr. Düng., 1955, **70**: 58-65, bibl. 5.

In trials with 3 tomato varieties, the ascorbic acid content of ripe fruits was not affected by Mn or B applications, but complete manuring depressed it. Biol. Bundesanst.—Land- Forstw., Berlin. [For part I see *H.A.*, 24: 2811.]

2518. Possingham, J. V.
The effect of mineral nutrition on the content of free amino acids and amides in tomato plants. II. A study of the effect of molybdenum nutrition.
Aust. J. biol. Sci., 1957, **10**: 40-9, bibl. 13.

Tomato plants which had been cultured in the absence of molybdenum were provided with molybdate, and the consequent changes in the relative amounts of the free amino acids and amides were followed over an experimental period of 4 days. The technique of quantitative paper chromatography was used to estimate the individual free amino acids and amides, and the results are expressed on a dry weight basis. Changes in the concentrations of many of the individual amino acids occurred within 4 hours of applying molybdenum. Large increases in the concentrations of aspartic acid, glutamic acid, glycine, glutamine, and asparagine occurred initially with molybdenum treatment, but were followed by steady declines. A difference pattern of change was shown by the two compounds β-alanine and γ-aminobutyric acid, both of which decreased in concentration soon after molybdenum was applied. The results of this investigation are discussed in relation to the pathway by which the products of nitrate reduction are incorporated into proteins. [Author's summary.]—Div. Plant Ind., C.S.I.R.O., Canberra. [For part I see *H.A.*, 27: 1560.]

2519. Coleman, R. G.
The effect of sulphur deficiency on the free amino acids of some plants.
Aust. J. biol. Sci., 1957, **10**: 50-6, bibl. 18.

Tomato was one of 5 species grown in water culture with and without S. Greatly increased amounts of free arginine occurred in all the S-deficient plants, accompanied in 4 of the species, including tomato, by a marked reduction in the glutamic acid content. The S-deficient plants also showed amide accumulation, the predominant amide, which in the tomato was glutamine, being the same as that found occurring in the greatest amount in normal plants. Increases in glycine and serine also occurred in all 5 species when S was deficient.—Div. Plant Ind., C.S.I.R.O., Canberra.

2520. Geraldson, C. M.
Evaluation of control methods for blackheart of celery and blossom-end rot of tomatoes.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 236-41, bibl. 5, illus.

The presence of excessive soluble Mg, K, Na or ammonium salts or a deficiency of soluble Ca salts (low Ca ratios) cause a decreased Ca uptake, and an increase in prevalence and severity of blossom-end rot and blackheart. Excess total salts can also cause Ca deficiency. Control should be aimed at maintaining an adequate supply of Ca in the soil by using liming materials which are good sources of soluble Ca and supplementary Ca sprays when necessary. —Gulf Coast Exp. Stat., Bradenton, Fla. [See also *H.A.*, 27: 546 and 1457.]

2521. Kidson, E. B.
Water-culture experiments on nutritional problems of the tomato.
A.R. Cawthron Inst. 1955/56, 1956, pp. 48-9.

Trials suggest that shade and high humidity are "cloud" inducing factors, though high humidity may not be harmful provided there is adequate light. The application of Fe, N or K did not affect incidence of cloud.

2522. Jackson, W. T.
The relative importance of factors causing injury to shoots of flooded tomato plants.
Amer. J. Bot., 1956, **43**: 637-9, bibl. 6.

Root systems of Marglobe tomato plants were subjected to various aeration treatments during flooding to determine the relative importance of an oxygen deficiency, an excess of carbon dioxide or other toxic substances, and plugging of the xylem by micro-organisms, their by-products, or the by-products of the plant itself, in causing the injury symptoms normally exhibited by shoots following flooding. A severe oxygen deficiency which caused rapid death of the roots and prevented formation of adventitious roots resulted in maximum injury of the shoots. Under conditions of extreme oxygen deficiency, removal of carbon dioxide from the solution decreased chlorosis and wilting of leaves slightly and resulted in a small increase in the growth rate of shoots. Again, under conditions of extreme oxygen deficiency, drainage and replacement of the flooding medium significantly reduced flooding injury. Little or no injury was exhibited by shoots of plants whose roots were flooded in water continuously aerated with compressed air. Shoots of plants whose roots were flooded in circulating tap water were only slightly injured, except for the epinastic response of leaves. Near maximum epinastic response was induced by a very small oxygen deficiency in the root environment. [From author's summary.] —Josiah Willard Gibbs Lab., Yale Univ., New Haven, Conn. [For earlier work see *H.A.*, 26: 1818.]

2523. Stanton, D. J.
Physiological disorders of tomatoes.
A.R. Cawthron Inst. 1955/56, 1956, pp. 50-2.

Physiological disorders may be classified into 3 groups. In Group A is found hard, abnormal, non-ripening tissue most pronounced at the stem end. In Group B blossom end rot is the feature. In Group C blotchy ripening and development of scars in the fruit occur. The factors affecting their incidence are light, day temperature, night temperature, water supply, major nutrients, minor nutrients. Suggestions are made on how to obtain optimum balance.

2524. Vlasov, Ju. I.
The resistance of tomatoes to streak as affected by ecological conditions. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **111**: 1127-9, bibl. 3.

In glasshouse experiments one batch of tomato plants was grown at an average daily temperature of about 23° C. and another at 18° C., at radiation intensities of about 300,000 erg/sq.cm./sec. and 100,000 erg/sq. cm./sec. respectively. Inoculation with tobacco-mosaic virus resulted in all the plants grown at the lower temperature and lower radiation intensity developing streak, whereas none of those grown at the higher rates did so. In outdoor trials low temperatures and low light intensities, i.e. unfavourable growth conditions, were found to encourage streak.

2525. Canova, A.
Ricerche intorno ad una virosi del pomodoro (mal della striscia). II. Presenza del virus sui semi e nel terreno. (**Studies on a virus disease of tomatoes (streak). II. The occurrence of the virus on seeds and in the soil.**) [English and German summaries ½ p. each.]
Phytopath. Z., 1957, **28**: 415-22, bibl. 10.

Streak, a strain of tomato mosaic virus occurring in the Marche region of Italy, was shown to be seed and soil transmitted. Seed infectivity may be reduced by washing the seeds in running water for 2 hours or by allowing the fruits to ferment. Seed immersion in 6% HCl for 24 hours completely killed the virus without affecting germination.—Ist. Pat. veg., Bologna.

2526. Bovey, R., Canevascini, V., and Mottier, P. P.
Influence du virus de la mosaïque du tabac sur le rendement de tomates infectées à différentes dates. (**The effect of tobacco mosaic virus on yields of tomatoes infected on different dates.**)
Rev. romande Agric. Vitic., 1957, **13**: 36-9, bibl. 4, illus.

Infection of young tomato plants both before and for some time after planting out with tobacco mosaic virus caused yield reductions of up to 30–40%. Fruit number was affected more than fruit weight. Infection of older plants caused smaller reductions in yield.—Stat. fed. d'Essais agric., Lausanne, and École cant. d'Agric., Marcelin-sur-Morges.

2527. Boyle, J. S., and Wharton, D. C.
The role of tobacco mosaic virus in abnormal ripening disorders of tomato.
Abstr. in *Phytopathology*, 1957, **47**: 4.

The role of 9 isolates of tobacco mosaic virus (TMV) in the development of internal browning (IB) of tomato was determined. Final records on incidence and severity were taken by harvesting and cutting all fruit. Each isolate was tested on 40 plants of the variety Rutgers; 3 were tested also on the varieties Kopiah and Geneva. The incidence of IB in the Rutgers variety inoculated August 7 and cut 20–40 days later varied with the isolate and ranged from 97·5 to 0%. Fruits from 40 non-inoculated control plants were all normal. In a replicated test, with plants inoculated August 23 and harvested 18–28 days later, the results were essentially the same with the incidence of IB ranging from 100 to 2·5%. Two of 40 noninoculated control plants produced IB fruit. The incidence of IB in the varieties Kopiah and Geneva inoculated August 7 ranged from 72·5 to 7·5% and from 95·0 to 2·6% respectively. One of 40 noninoculated Kopiah control plants produced IB fruit. Fruits from 38 plants of the variety Geneva were all normal. No abnormal ripening other than IB was induced by any of the isolates of TMV tested.

2528. Madramootoo, H.
Grafting tomato to resist bacterial wilt.
Trop. Agriculture Trin., 1957, **34**: 65-6.

Tomato scions have been successfully grafted on to related indigenous plants both experimentally and on a commercial scale. Young plants of the thorny shrubs burro-burro (*Solanum demerarense* and *S. juripeba*), which are wilt resistant, are used as rootstocks. They are planted out when 6–8 in. high and grown for about 2 months, then cut at 8–10 in. from the base just below a node and wedge grafted with 5–6 in. scions of 4–5-week-old tomato seedlings. Union is normally complete in 14 days and approximately 95% of the grafts are successful. Grafted plants produce several crops and the fruits are ready for harvesting in the usual 11–12 weeks.—Dep. Agric., Brit. Guiana.

J.R.L.

2529. Sowell, G., Jr.
The assay of streptomycin as it relates to the control of bacterial spot.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 244-7, bibl. 6, illus.

In preliminary tests techniques for the bioassay of streptomycin in plant tissue were developed. After 2 applications of 500 p.p.m. streptomycin residues in tomato plants varied from 37 to 110 p.p.m. Removal of the surface streptomycin had no influence on the severity of bacterial spot on these plants. Similar results were obtained with capsicums.—Gulf Coast Exp. Stat., Bradenton, Fla.

2530. Wilson, J. D., and Hedden, O.
Droplet size *versus* control efficiency of fungicidal spray applications.
From abstr. in *Phytopathology*, 1957, **47**: 37.

Variation in droplet size of a maneb spray from 100 to 500 μ made little difference in the degree of control of *Alternaria* blight on tomatoes.

2531. Newhook, F. J.
The relationship of saprophytic antagonism to control of *Botrytis cinerea* Pers. on tomatoes.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 473-81, bibl. 16, illus.

Strains of *Cladosporium herbarum*, *Penicillium*, and *Alternaria* isolated from dead tomato petals inoculated in pure and mixed culture on to sterilized dead petals 3–5 days before inoculating with *Botrytis cinerea* gave complete control of the latter fungus. Establishment of *C. herbarum* and *Penicillium* sp. on dead petals adhering to fruit following use of growth-substance sprays for fruit setting reduced *Botrytis* infection to 1–3%. Infection on trusses of check plants was 46–80%. Inoculation of dead petals or fruit with dead petals attached, taken from trusses at regular intervals or from trusses of different age, showed that infection rate dropped from almost 100% on newly dead petals to as low as 30% on older petals. Drop in infection rate was correlated with visible growth of saprophytes, mainly *C. herbarum* and *Penicillium* spp. Infection of leaves with leaf mould (*C. fulvum*) reduced the infection rate of this tissue when dead by *B. cinerea* from 100% to 13–38%. The nature of the antagonism to *Botrytis* is discussed, particularly in relation to the high level of control by saprophytes such as *C. herbarum*, which are not regarded as producers of strongly antibiotic substances. [Author's summary.]—Plant Dis. Div., D.S.I.R., Auckland.

2532. Cox, R. S., and Hayslip, N. C.
Notes on current development of gray mold, *Botrytis cinerea* Fr., of tomato and its control.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 235-6.

In preliminary tests in the Indian River area of Florida, Manalucie tomato plants became more susceptible to grey mould when repeated applications of nabam plus a metal salt were given. Vancide 51, Tennam, ferbam, thiram and dichlone have given an appreciable degree of grey mould control.

2533. Besemer, A. F. H.
Enige voorlopige gegevens over de bestrijding van *Botrytis cinerea* Fr. op tomaat. **(Some preliminary results with control of *Botrytis cinerea* on tomato.)**
Tijdschr. PlZiekt., 1957, **63**: 22.

Control of *Botrytis* on tomato fruits was satisfactory with maneb, zineb, dinitrorodanbenzene plus copper, and TMTD. These fungicides were much less effective against stem infections. In one experiment TMTD gave good control of *Botrytis* stem lesions when high volume sprays were applied.

2534. Croxall, H. E., Norman, T. M., and Gwynne, D. C.
Effect of 2:4:6-trichlorophenoxyacetic acid on the susceptibility of tomato plants to *Didymella lycopersici*.
Plant Path., 1957, **6**: 27-31, bibl. 3.

Results from 4 seasons' trials indicate that the application of 2,4,6-T at concentrations from 40 p.p.m. to 500 p.p.m. to tomato plants increased their susceptibility to infection by *Didymella lycopersici*. *Phytophthora* infection occurred in plants receiving 2 applications of 2,4,6-T at 50 p.p.m. or more.—N.A.A.S., Newcastle-upon-Tyne.

2535. (Horsfall, J. G.)
Recenti progressi sulla chemioterapia delle piante. **(Recent advances in chemical treatment of plant diseases.)**
Not. Mal. Piante, 1957, No. 39, pp. 5-9.

Various systemic fungicides were tested on tomato plants infected with *Fusarium lycopersici*. Some compounds alleviated the symptoms, but none controlled the disease. It is suggested that the browning of vascular tissue results from staining by derivatives of phenolic defensive substances produced by the plant. Further work should be directed to testing substances which would liberate phenols in the plant at the time of infection.—Conn. agric. Exp. Stat., New Haven.

2536. Sanwal, B. D.
Polyphenoloxidase and ascorbic acid oxidase activity in tomato plants infected with *Fusarium lycopersici* Sacc.
Proc. Indian Acad. Sci. Sect. B, 1956, **44**: 257-70, bibl. 30.

Enzyme activity was studied in tomato plants inoculated with *Fusarium lycopersici*. In diseased stems (showing vascular browning) ascorbic acid oxidase activity was similar to that in the controls. Leaves showing vein-clearing symptoms, between the 7th and 14th day of infection, showed less ascorbic acid oxidase activity than the controls, but this was increased to the level of the controls 21 days after infection. Polyphenoloxidase activity also decreased in leaves showing vein-clearing symptoms between 7 and 21 days after infection, but after this polyphenoloxidase content increased until it was almost double that of the controls 28 days after infection. In stems showing vascular browning polyphenoloxidase activity increased continuously from inoculation until complete wilting.—Univ. Delhi.

2537. Scheffer, R. P.
Grafting experiments with *Fusarium* wilt resistant and susceptible tomato plants.
Abstr. in *Phytopathology*, 1957, **47**: 30.

Susceptible (var. Bonny Best) and highly resistant (var. Jefferson) tomato plants were approach grafted in pairs. When graft unions were firm, the top of one plant and the bottom of the other in each pair were severed, and bud cell suspensions of *Fusarium oxysporum* f. *lycopersici* were introduced through spurs of scions. Combinations used were (1) susceptible scion on resistant stock, (2) susceptible scion on susceptible stock, (3) resistant scion on susceptible stock, and (4) resistant scion on resistant stock. Typical symptoms developed in susceptible tops of combinations 1 and 2. Plants with resistant tops did not show symptoms, regardless of the root type. Top leaves of several plants of combination 3 flagged without showing typical symptoms of the disease. In these cases the fungus was found to have invaded and caused vascular dysfunction in the susceptible stocks. These data are evidence against the theory that susceptibility depends on root-produced factors (i.e. that resistance results from lack of root-produced factors). Results also confirm earlier conclusions that resistance is present in stems and is not inherently different from the resistance expressed in roots.

2538. Collins, R. P., and Scheffer, R. P.
Systemic factors in *Fusarium* wilt of tomato.
From abstr. in *Phytopathology*, 1957, **47**: 6.

As early as 2 days after inoculation with *Fusarium oxysporum* f. *lycopersici*, leaves from infected plants had higher respiration rates than did disease-free controls. Higher respiration rates continued until plants showed advanced symptoms. Infection also caused increased permeability to electrolytes as early as 6 days after inoculation, as determined by conductivity of leaf leachings. Since leaves were not invaded by the fungus, these findings demonstrate systemic toxemia. Nothing indicated that the theoretical toxins were "wilt toxins" or necrotic agents. Attempts were made to determine whether ethylene, a known vivotoxin, affects permeability and other reactions. Negative results were obtained in experiments to determine effects of ethylene on pectin, pectic enzymes, transpiration rates and permeability to electrolytes. Ethylene hastened disease development when introduced in solution into inoculated cuttings and caused cuttings of similarly treated resistant plants to become diseased.

2539. Corrales M[acedo], A.
Comparativo de fungicidas para el control del *P. infestans*. **(Comparison of fungicides for control of *Phytophthora infestans*.)**
Inf. mens. Estac. exp. agric. La Molina, 1956, **30**(349): 43-4.

In 1954 tomato yields were significantly reduced by application of 1% bordeaux mixture, but 0·25% Parzate, Manzate or Dithane Z-78 had no significant effects. In 1955 [presumably under heavy infection] the yield from control plots was only 2% of that from Parzate-treated plots, while Manzate gave 94%, Dithane Z-78 gave 90%, and 0·75% bordeaux mixture 77%. [See also *H.A.*, 26: 3844.]

2540. Sánchez A., J. L.
Acción antibiótica del *Aspergillus flavus* sobre el *Phytophthora infestans*. **(Antibiotic action of *Aspergillus flavus* on *Phytophthora infestans*.)**
Inf. mens. Estac. exp. agric. La Molina, 1956, **30**(351): 7-12, bibl. 5.

Aspergillus flavus was more active than the bacteria, yeasts and fungi (including *Penicillium* spp.) hitherto known to check the growth of *Phytophthora infestans*. The extracted antibiotic controlled the fungus in culture and on greenhouse grown tomatoes. Its action was highly selective; the 14 other pathogenic fungi tested were not significantly checked by it. The active principle was thermostable. There was no systemic action.

2541. Leblond, D.
Essais de fongicides sur les tomates. **(Fungicide trials with tomatoes.)**
37th Rep. Que. Soc. Prot. Plants 1955, 1956, pp. 40-2.

In a trial with 5 fungicides captan gave the best disease control, late blight and *Phoma destructiva* being the most serious diseases occurring. Captan also increased individual fruit weights.

2542. Picco, D.
Lotta con anticrittogamici acuprici contro le crittogame del pomodoro. **(Treatment with non-copper fungicides against fungus diseases of tomatoes.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 123-31.

Late blight was satisfactorily controlled by 0·3% Amitan E (a zineb product) and by 0·3% zineb mixed with 0·1% karathane, both treatments being more successful than that with a copper-lime product and inducing earlier ripening. The best control of *Septoria lycopersici* combined with *Phoma destructiva* was given by zineb mixed with colloidal sulphur, which was slightly superior to zineb-karathane. Zineb alone was slightly less effective than the copper-lime product. Plants were more vigorous and yields higher when the first 2 of 6 serial captan treatments were carried out at 0·1% of SR 406 than with all 6 at 0·3%. In a crop attacked by several fungus diseases, yields were highest with Orthocide (captan) at 1%, almost identical with bordeaux mixture or ziram and rather lower with zineb. Captan-treated plants discarded after harvesting were more resistant to rotting than those from other treatments.

2543. Cristinzio, M.
Sperimentazione con acuprici su altre colture. **(Tests with non-copper fungicides on other crops [than fruit].)**
Not. Mal. Piante, 1957, No. 40/41, p. 119.

Zineb used on tomatoes was superior to copper products against late blight and leaf spot and slightly superior against early blight and grey leaf spot. It improved yield and quality.

2544. Edgington, L. V., and Walker, J. C.
The influence of soil and air temperature on *Verticillium* wilt of tomato.
From abstr. in *Phytopathology*, 1957, **47**: 8.

Microsclerotial isolates (M type) of *Verticillium albo-atrum* had higher optimal and maximal temperatures than did nonmicrosclerotial isolates (NM type) in culture. Relative influence of soil and air temperature on disease severity was studied by growing tomato plants, inoculated when 4–5 in. high, in soil at 20°, 24° and 28° C. in each of 4 greenhouses maintained at 16°, 20°, 24° and 28° C., and rating disease severity according to a wilt index at 16–19 days. With various combinations of 20° and 24° soil temperatures with 16°, 20° and 24° C. air temperatures, both isolate types incited severe wilt. With 28° air and 28° soil temperatures, only the M type incited wilt. With 28° soil temperatures, the NM type incited no wilt at any air temperature; with 28° air temperatures, moderate wilt developed at soil temperatures of 20° and 24°. Thus soil temperature had more effect than air temperature on disease development. The temperature within the plant stem was influenced predominantly by soil temperature during the day and by air temperature during the night. As light intensity increased up to 2,000 foot-candles, water uptake increased and soil temperature became more effective in controlling internal stem temperature.

2545. PEACOCK, F. C.
The effect of crop rotation on root-knot nematodes in the Gold Coast.
Emp. J. exp. Agric., 1957, **25**: 95-8, bibl. 4.

Field experiments were carried out in which different rotations were employed to reduce root-knot eelworm [*Meloidogyne* spp.] populations, the control being continuous cropping with a host plant [tomato]. The results showed that the greatest reduction in root-knot followed a cultivated bare fallow during a dry season. Reduction of the eelworm population by growing an immune crop (groundnut), commonly ascribed to 'starving out' the eelworm, was also highly effective, but trap-cropping with cowpea was not so effective, and was extravagant with seed and labour. [Author's summary.]—Univ. Coll. Gold Coast, Achimota.

2546. PEACOCK, F. C.
The effect of chemical treatments on root-knot nematodes in the Gold Coast.
Emp. J. exp. Agric., 1957, **25**: 99-107, bibl. 13.

Chemical control of root-knot eelworm [*Meloidogyne* spp.] in the Gold Coast by means of fertilizers was unsuccessful, although in one field experiment two top-dressings of ammonium sulphate, each of 1 cwt./acre, gave a small but significant reduction in root-knot on tomatoes. Calcium cyanamide and urea, which had shown promise in pot tests, were ineffective in the field, as also were muriate of potash and superphosphate. Soil injections with DD-mixture, ethylene dibromide, and an experimental compound, tetrachlorobutadiene (crude), all gave excellent control of eelworm on tomatoes under field conditions. With DD-mixture, only the crop immediately following the injection was protected, but ethylene dibromide and tetrachlorobutadiene showed a residual effect on a second susceptible crop. [Author's summary.]—Univ. Coll. Gold Coast, Achimota.

2547. JENKINS, W. R., AND COURSEN, B. W.
The effect of root-knot nematodes, *Meloidogyne incognita acrita* and *M. hapla* on *Fusarium* wilt of tomatoes.
Plant Dis. Reptr, 1957, **41**: 182-6, bibl. 14, illus.

Seedlings of highly susceptible, moderately resistant and highly resistant tomato varieties were inoculated with *Fusarium oxysporum* f. *lycopersici* and with either of the 2 *Meloidogyne* spp. Chesapeake, a highly resistant tomato, did not wilt except when root-knot nematodes were used in combination with inoculum of *Fusarium*. When *M. incognita acrita* was combined with *F. oxysporum* f. *lycopersici*, wilting resulted in every inoculation. Only 60% wilting was produced when *M. hapla* was combined with *Fusarium*. By contrast, artificial wounding of roots did not affect the susceptibility of the three tomato varieties tested.—Md agric. Exp. Stat.

2548. WILCOX, J., AND HOWLAND, A. F.
Experiments on control of the tomato russet mite in Southern California.
J. econ. Ent., 1956, **49**: 768-71, bibl. 2.

In experiments conducted from 1942 to 1955 very good control was obtained of tomato russet mite, *Vasates lycopersici*, by including 25% of sulphur in dusts applied for control of tomato fruit worm. There was very little difference in the effectiveness of dusts containing 25, 50, 75 or 100% of sulphur in 3 applications at 2-week intervals beginning when 5–10 fruits per plant had set. With 1 or 2 applications the results were inferior. Of other insecticides used toxaphene, chlordane, dieldrin and EPN, and in limited tests parathion, schradan, methyl parathion and isodrin, were effective. On plants grown during cool weather, as in late autumn or early spring, sulphur did not always give satisfactory results, but toxaphene, EPN, parathion and methyl parathion were found effective and can be used alone or combined with DDT for tomato fruit worm control. —Agric. Res. Serv., U.S.D.A.

2549. KHOT, B. D., AND KANITKAR, U. K.
Structure of flowers as related to setting in brinjals.
Poona agric. Coll. Mag., 1956, **47**: 17-22, bibl. 6.

Out of 498 flowers of 12 eggplant varieties that set fruit, 494 had the basal position in the inflorescence. Among basal flowers fertility was found to be largely determined by the relative position of stigma and anthers: for pollination to be successful the stigma must either protrude from the anther cone or it must not be depressed by more than 4 mm. below the tips of the anthers.

2550. GAROFALO, F.
Osservazioni sui semi di melanzana infetti da *Fusarium*. (**Observations on eggplant seeds infected with *Fusarium*.**)
Nuovo G. bot. ital., 1955 (issued 1956), **62**: 545-6.

Experiments proved that *Fusarium* infection of the fruit was transmitted by the seeds, either preventing germination or killing the young seedling by invasion from the testa. Complete control was given by coating the seeds with an organic mercurial fungicide (Mercurigamma) containing 1% of the active substance, using 20 g. per kg. of seed. *F. oxysporum*, *F. moniliforme* and *F. scirpi* var. *caudatum* were involved. [See also *H.A.*, 27: 565.]

2551. CORRALES MACEDO, A.
Sistemas de sembrío (siembra) en el cultivo de ají. Año 1955. (**Planting systems for red pepper, 1955.**)
Inf. mens. Estac. exp. agric. La Molina, 1956, **30**(348): 21-4, and *Bol. trim. Exp. agropec. P.C.E.A., Lima*, 1956, **5**(1): 2-5, bibl. 1.

Loss from wilt (*Fusarium annuum*) was slightly, but not significantly, less after direct sowing by machine than after direct sowing by hand, and was greatest in transplants. In a previous experiment [see *H.A.*, 26: 1834] these differences had been strongly marked. Direct sowing gave an earlier harvesting date in both experiments.

2552. Jha, A., and Raychaudhuri, S. P.
Mosaic disease of chilli (*Capsicum frutescens* L.).
Indian J. agric. Sci., 1956, **26**: 217-22, bibl. 19, illus.

The symptoms of chilli mosaic on chilli peppers and other hosts are described. The disease was transmitted by sap inoculation and, to a limited extent, by *Aphis gossypii*, but it was not transmitted by seed. The virus was inactivated by exposure to 60° C. for 10 min., by dilution to 1 : 30,000, and by treatment with several chemicals and ultra-violet light.—Indian agric Res. Inst., New Delhi.

2553. Cox, R. S.
Additive effect of Agri-mycin and copper in the control of bacterial spot of pepper.
From abstr. in *Phytopathology*, 1957, **47**: 6-7.

Agri-mycin and Copper A (calcium copper chloride) each gave appreciable control of bacterial spot (*Xanthomonas vesicatoria*) of capsicums in 8 field trials during 1954–56. Usually Agri-mycin was more effective than Copper A, but occasionally the reverse was true. A mixture of the 2 chemicals was more effective than either used alone.

2554. Castellani, E., and Serra, F.
Prove di disinfezione del terreno con acuprici per la lotta contro la cancrena pedale del peperone. **(Soil disinfection tests with non-copper fungicides for control of foot rot of red pepper.)**
Not. Mal. Piante, 1957, No. 40/41, pp. 137-40, bibl. 4.

Suspensions of 2–2·5% Fermate injected into the soil gave excellent control of *Phytophthora capsici* in seedbeds, but corresponding treatments with Parzate were almost useless. Both were applied at 2·5 l. per m². Powdered zineb and captan (SR 406) were compared by application to planting furrows. The virtual failure of zineb was probably due to soil acidity. Captan gave moderate control.

Sundry crops.

(*See also* 2449, 2556a, y, 2664.)

2555. Samad, A. A., and Chandramohan, J.
Chekur manis is a Malayan vegetable.
Indian Fmg, 1957, 6(11): 18-19, illus.

This small euphorbiaceous shrub, *Sauropus androgynous*, is becoming popular as a leafy vegetable. Its food value is high and the leaves and young shoots can be eaten raw or cooked. It is normally raised from cuttings planted directly in the field, spaced 2 ft. × 12–18 in., and the first plucking of shoots starts about 4 months later. Recent trials have shown that it can also be raised from seed, fresh seeds giving 78% germination against 34% for dried seeds.—Agric. Res. Stat., Pattambi.

Noted.

2556.

a Agrawal, J. S., Khanna, A. N., and Singh, S. P.
Studies in floral biology and breeding of *Momordica charantia* Linn.
Indian J. Hort., 1957, **14**: 42-6, bibl. 2, illus.

b Allerton, F. W.
Ring culture—reviewing recent developments.
Comm. Gr., 1957, No. 3194, pp. 613-17, illus.
For tomatoes, lettuces and carnations.

c American Vegetable Grower.
All about tomatoes.
Amer. Veg. Gr, 1957, **5**(3): 11-51, illus.
A special issue containing articles on varieties and cultural methods.

d Andeweg, J. M., and Ruyten, J. H.
Seven years' experience with hybrid tomatoes. [Dutch summary ½ p.]
Euphytica, 1957, **6**: 26-37, bibl. 10, illus.
In the Netherlands.

e Andeweg, J. M., and van Steenbergen, A.
Praktijkproeven met tuinbonen 1955-1956. **(Field trials with broad beans *1955-1956*.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 133-9, illus.
Selections included 5 early, 2 second early and 2 late varieties.

f Anon.
Attacchi di *Vesperus strepens* a radici di pomodori. **(Attacks of *Vesperus strepens* on tomato roots.)**
Inf. Fitopat., 1957, **7**: 23, illus.
Controlled by soil applications of 5% sodium cyanide or of chlorinated insecticides.

g Anon.
Celery drench mechanisation.
Comm. Gr, 1957, No. 3199, p. 853, illus.
Machines for drench spraying celery for carrot fly control.

h Anon.
Vegetable varieties. New for 1957.
Market Grs' J., 1957, **86**(1): 8-12.
79 vegetable, 2 watermelon and 3 strawberry varieties described.

i (Baldacci, E.)
Malattie del fagiolo, pisello, fava e lupino trasmesse per seme. **(Seed-transmitted diseases of kidney bean, pea, broad bean and lupin.)**
Sementi elette, 1957, **3**: 64-8, illus.
Symptoms, and in most cases seed treatments.

j Banga, O.
Origin of the European cultivated carrot. [Dutch summary 9 lines.]
Euphytica, 1957, **6**: 54-63, bibl. 38, illus.
Probably in the Arab countries, coming to Europe in the 13th or 14th century.

k BANGA, O.
The development of the original European carrot material.
Euphytica, 1957, **6**: 64-76, bibl. 33, illus.
From original purple and yellow types to the present orange red. Illustrated by details from old paintings.

l CARDONA ÁLVAREZ, C.
Pudriciones fungosas radiculares del frijol (*Phaseolus vulgaris* L.) en el valle de Medellín, Colombia. **(Fungal root rots of beans (*Phaseolus vulgaris*) in the Medellin valley, Colombia.)**
Rev. Fac. nac. Agron. Medellín, 1954, **15**: 133-209, bibl. 29, illus. [received 1957].
Resistance of 37 varieties to many pathogens tested.

m CHAVAN, V. M., AND OTHERS.
Is introduction an aid to onion improvement in Bombay?
Poona agric. Coll. Mag., 1956, **47**: 93-102, bibl. 4, illus.
All introduced varieties failed to produce seed.

n CONEV, D. T.
The problem of amino-acid composition in certain brassicas. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **111**: 1300-3, bibl. 3.
Quantitative determination in white and red cabbage, savoy, brussels sprouts and cauliflower.

o CRUICKSHANK, I. A. M.
A note on the incidence of *Ascochyta* species in pea seed.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 497-9, bibl. 7.
Including confirmation of importance of dry weather for producing disease-free seed.

p DORRELL, J.
Dutch house cropping at Roden.
Agriculture, Lond., 1957, **64**: 19-22, illus.
Mainly tomatoes and lettuce on a highly productive commercial enterprise.

q EPTING, J. C.
Radish harvester.
Amer. Veg. Gr, 1957, **5**(4): 18, illus.
Multiple-row harvester pulls and tops 1 acre per hour.

r ERMOLAEVA, E. JA.
The effect of high rates of phosphorus on increasing the cold resistance of tomatoes. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **111**: 1130-3, bibl. 9, illus.
High rates of P increased resistance to cold, starch and chlorophyll in leaves and photosynthetic activity.

s GUILLEMENET, R.
Attention à la tache du collet des semis de tomates. **(Beware of collar rot in tomato seedlings.)**
Terre maroc., 1957, **31**: 24-5, illus.
Control of *Alternaria solani* in seedbeds.

t HAZINA, E. P.
New varieties of sweet pepper obtained by vegetative hybridization. [Russian.]
Agrobiologija, 1956, No. 6, pp. 47-54, bibl. 1, illus.
Raised from seeds of hot pepper grafted on sweet pepper.

u HENRIKSEN, A.
Sortsforsøg med lave voksbønner. 1952-55. **(Variety trials with wax-podded dwarf beans, 1952-55.)** [English summary 1¼ pp.]
Tidsskr. Planteavl, 1956, **60**: 515-29.
Based on yields, quality and disease resistance.

v HOOPER, M. M.
Production of spinach for processing on muck soils of central Florida.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 261-2.

w HUSAIN, A., AND KELMAN, A.
Presence of pectic and cellulolytic enzymes in tomato plants infected by *Pseudomonas solanacearum*.
Phytopathology, 1957, **47**: 111-12, bibl. 5.
Cellulase and polygalacturonase responsible for tissue breakdown.

x JONES, E. R. H., AND TAYLOR, W. C.
Some indole constituents of cabbage.
Nature, 1957, **179**: 1138, bibl. 4.
Indole-3-aldehyde and indole-3-carboxylic acid.

y KAMATH, S. H., AND SOHONIE, K.
Proteins of green leafy vegetables: Part I.
J. sci. industr. Res. India, 1956, **15C**: 121-3, bibl. 12.
In *Amaranthus gangeticus* and *Trigonella foenum-graecum.*

z KURKI, L. M., AND WITTWER, S. H.
Thermoperiodi[ci]ty and flower formation in some tomato varieties. [With Finnish summary.]
Maataloust. Aikakausk., 1956, **28**: 223-8, bibl. 19.
See *H.A.*, 27: 524.

2557.

a (LALATTA, F.)
Angurie senze semi. **(Seedless watermelons.)**
Sementi elette, 1957, **3**: 79-80, bibl. 1.
Induced parthenocarpy in triploid plants with brief information on their cultivation.

b LAMBETH, V. N.
Tucker's forcing tomato.
Res. Bull. Mo agric. Exp. Stat. **597**, 1956, pp. 8.
A wilt and mould resisting glasshouse tomato.

c LAMM, R., HINTZE, S., AND ÅVALL, H.
Klassificerande sort- och stamförsök med köksväxter 1952-1955. **(Vegetable variety trials in Sweden 1952-55.)** [Summaries in English pp. 1¾, and Esperanto ½ p.]
Meddel. Trädgårdsförs. Alnarp **98**, 1956, pp. 26, bibl. 3.

d Lear, B., and Thomason, I. J.
Soil fumigation for nematodes.
Calif. Agric., 1957, **11**(2): 6, 15, 16.
Meloidogyne spp. on tomatoes [see *H.A.*, 27: 1576].

e Léontovitch, C.
La fumure des plantes au moyen de l'acide carbonique. **(Fertilizing plants with carbon dioxide.)**
Bull. agric. Congo belge, 1956, **47**: 1633-7.
A review of results, with vegetables, mainly from Russia.

f Marinkov, E.
Studies on heterosis in tomatoes in connection with the possibilities of early selection. Preliminary communication. [Bulgarian, with Russian summary ¾ p.]
Nauč. Trud. selskostop. Akad. Georgi Dimitrov., Sofia, 1952, **1**: 43-56, bibl. 8.

g Masefield, G. B.
The nodulation of annual leguminous crops in Malaya.
Emp. J. exp. Agric., 1957, **25**: 139-50, bibl. 4.
Crops included in survey included french beans and peas.

h Ministry of Agriculture, London.
Outdoor tomatoes.
Adv. Leafl. Minist. Agric. Lond. **360**, revised 1957, pp. 6.
Varieties, culture, packing, pests and diseases.

i Myrstad, A., and Johnsen, J. K.
Sortsforsøk med veksthustomat 1956. **(Variety trials with glasshouse tomatoes 1956.)**
Gartneryrket, 1957, **47**: 5-6.

j Myrstad, A., and Johnsen, J. K.
Sortsforsøk med salatagurk 1956. **(Variety trials with cucumbers 1956.)**
Gartneryrket, 1957, **47**: 22-3.

k Osborne, P., and Turner, D. H.
Combating blindness by swede midge.
Grower, 1957, **47**: 552-3, illus.
Sprays of 0·1% DDT emulsion effective on cauliflowers.

l Pittman, J. F.
The vegetable areas of America. South Carolina.
Amer. Veg. Gr, 1957, **5**(4): 12, 13, 57, illus.

m Pucci, E.
Alcune alterazioni della cipolla nella passata campagna. **(Some disorders of onions in the last season.)**
Inf. fitopat., 1957, **7**: 20-2, illus.
Control of downy mildew (*Peronospora destructor*) and thrips.

n Quansah, S. T.
The shallot industry, incorporating a recent survey of the Anloga growing area.
New Gold Cst Fmr, 1956, **1**: 45-9, illus.
A survey with a map.

o Revilla, V. A., Vargas, R., and Sánchez A., J. L.
Control del "oidium" del frijol. Campaña 1955. **(Control of bean mildew. 1955.)**
Inf. mens. Estac. exp. agric. La Molina, 1956, **30**(348): 18-20.
Inconclusive results with fungicides against *Erysiphe polygoni.*

p Rich, A. E., and Yeager, A. F.
New Hampshire Surecrop.—A new tomato variety highly resistant to late blight and moderately resistant to early blight.
From abstr. in *Phytopathology*, 1957, **47**: 28.
An early variety producing a good crop of medium-sized fruits.

q Rodriguez S., H.
Enfermedades del frijol (*Phaseolus vulgaris*). **(Diseases of beans.)**
Fitófilo, Mexico, 1955, **8**(12): 32-6, from abstr. in *Turrialba* (*Suppl. bibl.*), 1956, Vol. 6, abstr. 193/56.
Symptoms and control in Mexico.

r Salunkhe, D. K.
Histological and histochemical changes in gamma-irradiated lima beans, *Phaseolus lunatus*.
Nature, 1957, **179**: 585-6, bibl. 1, illus.

s Scott, F. M., and others.
Ultrasonic and electron microscope study of onion epidermal wall.
Science, 1957, **125**: 399-400, bibl. 9, illus.
Leaf surface and wax deposit.

t Soldatenkov, S. V., and Mazurova, T. A.
Malonic acid in leguminous plants. [Russian, with English summary ¼ p.]
Biohimija, 1957, **22**: 345-50, bibl. 10.
Up to 2–3% of dry weight in leaves of peas, beans, etc.

u Torti, M.
Carote per carotène. **(Carrots for carotene.)**
Ital. agric., 1955, **92**: 660-3, bibl. 1, illus.
Types of carrot and when to harvest them.

v Traaen, A. E.
Bacteriosis on tomato plants in Norway. [Norwegian summary ½ p.]
Meld. norg. LandbrHøgsk., 1955-56, **35**: 205-10, bibl. 4. [Received 1957.]
Reviewing work on *Corynebacterium michiganense.*

w Whellan, J. A.
Report of the Chief Entomologist for the year ending 30th September, 1955.
Rhod. agric. J., 1957, **54**: 82-92, bibl. 2.
Including control of cabbage aphid, *Brevicoryne brassicae*, by 0·006% isolan or 0·08% nicotine sulphate.

x Whitner, B. F., Jr.
Progress report on cantaloupe varieties.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 195-8.

TOBACCO.

General.

2558. Stinson, F. A.
Tobacco farming in Rhodesia and Nyasaland, 1889-1956.
Tobacco Research Board of Rhodesia and Nyasaland, 1957, 7×5 in., pp. 91, bibl. 58, illus.

Information gleaned from earlier publications, some now out of print, is supplemented by the author's own impressions and presented in 12 simply written chapters, covering, among other things, the history of tobacco farming in Rhodesia and Nyasaland, research and extension organization, administrative progress since 1951, the gradual evolution of technology, land use, tobacco soils, fertilizer practices, the use of labour and machinery, flue-cured varieties and the advantages and disadvantages of priming.

2559. Collins, J. C.
Review of research on flue-cured Virginia tobacco in Northern Rhodesia from 1951-52 to 1954-55.
Agric. Bull. N. Rhod. Dep. Agric. **12**, 1956, pp. 77, 3s. 6d.

This report is in two parts. Part I—Research—describes 22 experiments. Part II provides a critical survey of local methods of production and makes many suggestions of practical value to growers. The experiments described in part I are as follows: 1-5. *Seed-bed experiment:* Seedlings raised in beds which were watered from below by capillary action were much better than those raised in standard beds which received overhead watering; the substitution of vermiculite for soil in the capillary beds was uneconomic. Beds covered with cheese-cloth produced better seedlings than beds covered with combed grass, but still better results were obtained in beds covered thinly with a grass mulch. A flamethrower did not provide a satisfactory means of sterilizing a seed-bed, the depth of heat penetration being much less than that obtained by burning brushwood. Among chemicals tested against anthracnose (*Colletotrichum tabacum*) the best was zineb; copper compounds proved unsatisfactory. 6. *Variety trials:* In four years' trials on virgin soil the best cash returns were given by Hicks Broad Leaf, Jamaica Wrapper, Gold Dollar and C/10; Virginia Gold and Yellow Prior showed promise in 2 years. In 2 trials in 1 season on second-year land the best cash returns were given by C/10, Bonanza and White Stem Orinoco, the last two of which had given poor results in the virgin-soil trials. 7-12. *Fertilizer experiments:* Trials on virgin soils at both Msekera and Mochipapa emphasize the importance of adequate N, about 21 lb. per acre appearing to be optimal for the former soil and at least 36 lb. for the latter. High N has shown no adverse effect on quality except when accompanied by low P and K; for the Mochipapa soils the best levels would appear to be in the region of 36 lb. or more N, 70–110 lb. P_2O_5 and 48–72 lb. K_2O. In some instances, but not others, applying part of the dose as a top dressing may be beneficial. Observations on different methods of application did not reveal any advantage from the use of two types of 'gun' over fertilizing by hand (ring method). 13. *Effect of compost on nematode-infested land:* On soils at two stations, known to be heavily infested with root-knot nematodes, kraal manure and chemical-starter compost at 7 and 14 tons per acre increased tobacco yields significantly. 14. *Lausanne tying machine:* Showed no advantage over hand-tying for flue-cured tobacco. 15. *Joelson's patent tobacco stalk-drawing machine:* Showed no advantage over uprooting by hand. 16. *Priming experiments:* Results of trials comparing light, moderate, severe and no priming suggest that in crops grown from disease-free seedlings a very light priming is desirable, though not essential. 17. *Chemical control of suckers:* Observations on the use of Sukerol compared with hand suckering suggest that there is little to choose between the two methods. 18. *Interaction between incidence of Alternaria longipes and fertilizer treatment:* Interactions insignificant in 2 seasons. 19. *Boron deficiency:* In B-deficient crops on Msekera Station applications of up to 8 lb. borax per acre improved yield, quality and cash return, but were insufficient to eliminate all signs of B deficiency. 20. *Coarse dark midribs:* Attempts to trace the cause of this defect found in flue-cured tobacco from N.E. Rhodesia have shown that it is not due to variety, soil or fertilizer practice; an experiment to determine the effect of drought was upset by abnormal rains. 21. *Curing by steam:* An interim report is provided on a steam unit and its advantages and disadvantages enumerated. 22. *Palatability tests and chemical analyses:* Reports on samples sent to New Zealand and the U.K. are recorded in detail; no firm conclusions can be drawn, but the results suggest that methods of conditioning (steam *vs.* brick-lined pits) deserves closer study.

2560. Molnár, L.
A kerti dohány termelésének hanyatlása. (**Decline in the production of "garden" tobacco.**)
Dohányipar, 1956, No. 4, pp. 7-12, from abstr. in *Hung. agric. Rev.*, 1956, **5**(3): 5-6.

The small leaved "garden" tobacco is grown in Hungary by a method which differs in many ways from that used for other tobacco types. Its distinguishing features are that the crop is grown continuously in the same place, on sandy, loose, poor, warm soils, in dense stands (about 100,000 plants per ha.), it is not topped and the leaves are sun-cured. Experimental results have shown that this system, though well suited to the original type, is not satisfactory for its hybrids.

Varieties.

(*See also* 2559, 2615e.)

2561. Lumang, H., Reyes, R. S., and Apon, C.
Preliminary study on the fire-holding capacity of tobacco leaves of different varieties and types.
Philipp. J. Agric., 1955 (issued 1957), **20**: 35-42, bibl. 7.

The fire-holding capacity of the leaves of different varieties and types of tobacco was determined in two seasons. In general, the fire-holding capacity of Virginia tobaccos was inferior to that of wrapper, burley, filler and Turkish tobaccos, but this quality also varied with variety, season, locality in which grown, leaf thickness and length of ageing.

2562. Madamba, U. V., and Sison, B.
A comparative test of five varieties of wrapper tobacco at Kidapawan Wrapper Tobacco Experiment Station, Cotabata, Mindanao.
Philipp. J. Agric., 1955 (issued 1957), **20**: 21-33, bibl. 4.

The results are reported of trials extending over 3 years, in which plant characteristics, yields and quality were recorded. In both yield and quality the best variety was Baker Sumatra, followed, in descending order, by Ax Hybrid, Florida Sumatra, R.G. and Florida No. 301.

2563. Mann, T. J., and Chaplin, J. F.
The effect of the mammoth gene on certain quantitatively inherited characters of flue-cured tobacco.
Agron. J., 1957, **49**: 230-3, bibl. 6.

Six day-neutral flue-cured tobacco varieties were compared with 18 backcross-derived short-day (mammoth) selections. The mammoth selections produced fewer pre-topping suckers, more leaves, fewer post-topping suckers, higher yields, greater acre values, and lower values per hundredweight than did the day-neutral varieties. With the exception of the reduction in value per hundredweight, the effects of the mammoth gene may be considered favourable. In 2 of the 6 families, Dixie Bright 101 and 102, yield increases were obtained without loss in quality as measured by value per hundredweight and grade distribution. [From authors' summary.]—N.C. agric. Exp. Stat., Raleigh.

2564. Popov, M. D.
Recherches sur l'hétérosis du tabac. (**Studies on heterosis in tobacco.**) [Russian summary 8 lines.]
C.R. Acad. bulg. Sci., 1956, **9**(4): 81-3, bibl. 9.

The F_1 hybrid of Virginia Bright ♀×the Bulgarian variety Kozarsko No. 541 ♂ matured earlier, grew taller and produced 56·6% higher yield of total fresh weight than its female parent.

Seeds and seed-beds.

(*See also* 2559, 2615u.)

2565. Gončar, A. L.
Improving the germination of freshly harvested tobacco seed. [Russian.]
Tabak, 1956, **17**(4): 55.

Germination of fresh tobacco seed was greatly improved by treatment for 30–40 days at 25–30° C. and 60–75% relative humidity [see also *H.A.*, 26: 2880].

2566. Oseledec, N. N.
The effect of chlorides and sulphates on the growth and development of tobacco seedlings. [Russian.]
Tabak, 1956, **17**(4): 53-5.

Seeds of the tobacco variety Trapezond 93 were sown in Petri dish sand culture and supplied with varying levels of Cl, SO_4, and Cl+SO_4. Salt concentrations of 0·002–0·005% slightly stimulated germination, rates of 0·01–0·02% had no effect, 0·05% retarded germination, and 0·4% and above inhibited germination. The effect of these salts on the growth and dry matter content of the seedlings showed a similar trend. Increasing rates reduced the dry matter content in the leaves and stems rather more quickly than in the roots, and the presence of both salts was slightly more injurious than either of them alone.

2567. Pyriki, C., and Kunstmann, F. W.
Keimfähigkeit und Gehalt an freien Fettsäuren bei Tabaksamen unter Berücksichtigung der Citronensäure. (**Germination capacity and free fatty acid content in tobacco seeds, with special reference to citric acid.**)
Pharmazie, 1956, **11**: 798-805, illus., from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/52.

It was found that the relation between germination capacity and free fatty acid content of tobacco seed corresponds to that of other oil seeds and that a fatty acid content of up to 0·6% will permit satisfactory germination. Reduced germination caused by bad storage conditions was not associated with an accumulation of fatty acids, but citric acid was shown to decrease under such conditions. No relationship was apparent between germination capacity and iodine number or pH value.

2568. Wells, C. G., and others.
The effects of phosphorus and organic matter on the concentration of certain decomposition products of cyanamid in tobacco plantbeds.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 192-6, bibl. 4, illus.

Injury to tobacco seedlings from residues of cyanamide previously used for weed control was prevented by applying ¾ lb. per sq. yd. of 20% superphosphate with the cyanamide. Application of organic matter decreased soil pH and the excess of ammonium N, but not sufficiently early for seeding. Stunted growth, and sometimes death, occurred where soil pH was above 8 and ammonium N above 350 p.p.m.

2569. Ortiz R., G., and Sepulveda, R.
Efecto de varios fumigantes del suelo en el control de malezas y de la enfermedad del sancocho o natilla en los semilleros de tabaco. (**Effect of various soil fumigants on control of weeds and damping-off in tobacco seed beds.**) [English summary 7 lines.]
Agric. trop. Bogotá, 1956, **12**: 797-803, bibl. 5, illus.

Dowfume MC-2 (methyl bromide) was applied at 1 lb. per 5 sq. m. and Bedrench (81% allyl alcohol+11·5% ethylene dibromide) at 1·5 gal. per 100 sq. m. Both treatments controlled *Pythium debaryanum* infection, but Bedrench had much better herbicidal action than Dowfume and needed no gas-proof soil cover after application.

2570. Aquilizan, F. A.
Seedbed spraying for the control of *Cercospora* leaf spot of tobacco.
Philipp. Agric., 1956, **40**: 146.

Four fungicides were tested with the following results: (i) Manzate and bordeaux gave better control than

Orthocide, (ii) seedlings sprayed with bordeaux and Fermate had darker foliage and stems than the others, (iii) all treated seedlings grew significantly better than the control, especially those sprayed with Orthocide and bordeaux, and (iv) none of the treatments showed a marked residual effect after transplanting.

2571. Todd, F. A.
Wildfire control in burley tobacco.
Ext. Circ. N.C. agric. Ext. Serv. **401**, 1956, pp. 11, illus.

Instructions are given for treating seed beds with bordeaux mixture or streptomycin sulphate to control wildfire, *Pseudomonas tabaci*. Supplementary precautions are the digging of a drainage ditch around the beds and avoiding the application of fertilizers with the spray treatments as this may cause severe injury. In the field the only effective control is the use of a wildfire-resistant variety such as the new Burley 21. High N and low K fertilization favours the disease.

2572. Shaw, L., Lucas, G. B., and Thorne, G. F., Jr.
Further studies with streptomycin alone and in combination with other chemicals for wildfire control in burley tobacco plant beds, North Carolina, 1956.
Plant Dis. Reptr, 1957, **41**: 99-102, bibl. 7.

Effective control of wildfire (*Pseudomonas tabaci*) was obtained with 6 weekly spray applications of streptomycin sulphate at 100 p.p.m. and 200 p.p.m., and of streptomycin nitrate at 200 p.p.m. The use of glycerin with streptomycin sulphate had only a slight beneficial effect on wildfire control, but the addition of tribasic copper sulphate generally decreased the amount of wildfire. Drench and dust application of streptomycin sulphate generally did not give effective wildfire control. —Agric. Res. Serv., U.S.D.A., and N.C. agric. Exp. Stat.

Water and other climatic factors.

(*See also* 3011.)

2573. Gubenko, F. P.
Agro-ecological variability of tobacco.
[Russian.]
Tabak, 1957, **18**(1): 55-8, bibl. 2.

Variations were noted in the thickness, weight and moisture absorbing capacity of technically mature, dried leaves taken from corresponding levels on the stems of 4 tobacco varieties grown in 9 different geographical areas.

2574. Chouteau, J.
Évaluation des besoins en eau du tabac.
(Evaluation of the water requirements of tobacco.)
C.R. Acad. Agric. Fr., 1956, **42**: 834-45.

In preliminary studies the water uptake of tobacco plants in pots was found to be related to age, reaching a maximum about the end of the 2nd month of growth. In the field water uptake from the layer of tilled soil (0–30 mm.) was also primarily a function of plant development. Water absorption from deeper layers was dependent on climatic conditions. In calculating irrigation needs it was shown that the critical deficit in the plough zone, below which transpiration is reduced, is equivalent to about 1·4 times field capacity. Irrigation should be applied when this critical deficit is reached in the tilled layer of soil.—Inst. exp. Tabac, Bergerac.

2575. Johanson, R.
Trashy leaf in Australian-grown flue-cured tobacco: the light factor in the development of amenenic leaf.
Aust. J. biol. Sci., 1957, **10**: 25-39, bibl. 33.

Artificial shading of mature plants of a flue-cured variety tobacco in the field 4–14 days before harvesting produced 22% loss in weight of leaves. Their labile hexose-carbohydrate content was about 64% less than that of control leaves; when cured, shaded leaves were trashy. In plants receiving extra sunlight the weight per unit area of leaves was increased by 20%, and their carbohydrate content by 45%; there were no trashy leaves with this treatment. Control leaves occupied an intermediate position between shaded and extra-light leaf in composition and quality. On an absolute basis, treatments virtually had no effect on total and protein nitrogen, but, on a dry weight basis, shaded leaf had about twice as much nitrogen as that of leaves with extra light. Shading of leaves reduced the average ratio of carbohydrates to nitrogen (curing index) to one-third as compared with the controls, and produced leaf with poor flue-curing properties; such leaf loses yellow pigments and other desirable compounds during the starvation period of curing. Green leaves have considerable capacity to absorb light; as little as 3% may pass through a single leaf. Tobacco leaves being entire may contribute extensively to poor light conditions and internal shading. It is concluded that light is often a limiting factor in dense crops and during periods of cloudiness, thus contributing to production of trashy leaf. [Author's summary.]—Div. Plant Ind., C.S.I.R.O., Canberra. [For earlier investigations see *H.A.*, 22: 2771.]

2576. Pointer, J. P., and Woltz, W. G.
Investigations of hail damaged tobacco.
Tech. Bull. N.C. agric. Exp. Stat. **123**, 1956, pp. 31, bibl. 25, illus.
Hawks, S. N., and Bennett, R. R.
When hail hits tobacco.
Ext. Circ. N.C. agric. Ext. Serv. **398**, 1956, pp. 11, illus.

In a series of experiments hail damage was simulated by cutting plants off 6–8 in. above the ground, destroying varying proportions of individual leaves, and punching holes in leaves. The treatments were applied separately and in combination at various stages of growth. Various fertilizer and cultural treatments were also tested, and in some cases late-planted plots were included to simulate replanting. The results showed that: (1) Where cutting off was done within 3 weeks of transplanting cropping was little affected, but thereafter for each week that cutting off was postponed yield declined by 9·19% and value by 9·16%. (2) Growing on the cut-off plants from a sucker gave better results than replanting at all dates. (3) Top dressing the cut-off plants with 10 lb. N per acre did not appear beneficial where the original fertilizer applications had been adequate. (4) Deep cultivation after cutting off checked growth initially but had little effect on ultimate yield and value. (5) The control of weeds and grasses by shallow cultivation was an important factor in the recovery of cut-off plants. (6) Stripping all the leaves up to the bud did not encourage suckering on the lower part of the stem. (7) Both yield and value declined with an increase in the amount of leaf area destroyed, yield being depressed most by the removal of whole leaves and value by the removal of portions of leaves. (8) Punching from 80 to 560 ¾-in. holes per plant had little effect on yield but depressed value. (9) Leaf holes and the flaps left hanging from them enlarged as the leaves grew. (10) Yield, value per acre and value per 100 lb. decreased with delay in time of leaf damage. (11) The various treatments, apart from top-dressing with N, had little effect on the sugar, N and nicotine contents of the leaf. (12) Undamaged plants lost an average of 5·8 lower leaves between planting out and first harvest. Results obtained by growers, whose crops were damaged by hail, were in general agreement with those obtained experimentally. Both diseases and weather affected the recovery of damaged crops.

The second publication gives a popular outline of the same work and suggests methods of salvaging hail damaged crops.

Soils and nutrition.

(*See also* 2054, 2558, 2559, 2566, 2615d, h, m, 2831.)

2577. Hauser, J.
Adatok a Virginia dohány talajigényének megismeréséhez. (**The soil requirements of Virginia tobacco.**)
Dohányipar, 1956, No. 4, pp. 5-6, from abstr. in *Hung. agric. Rev.*, 1956, **5**(3): 6.

Tobacco varieties long established in Hungary grow well on slightly alkaline soils, but the Virginia types introduced some 20 years ago produce satisfactory results only on slightly acid, lime-free soils. In pot experiments 35-day-old Virginia seedlings developed best and gave the highest dry matter and ash content, both in roots and aerial parts, when grown at a pH 6·1, while the least satisfactory results were obtained at pH 8·2.

2578. Kincaid, R. R., and Gammon, N., Jr.
Effect of soil pH on the incidence of three soil-borne diseases of tobacco.
Plant Dis. Reptr, 1957, **41**: 177-9, bibl. 1.

Test crops of tobacco have been grown under shade for 3 seasons on quadruplicate field plots, adjusted to 5 different pH levels with elemental sulphur and hydrated lime. Each year the incidence of blackshank (*Phytophthora parasitica* var. *nicotianae*) in a susceptible variety varied directly with soil pH; differences were highly significant. Blackshank in resistant varieties rose significantly with increasing soil pH to 5·5–5·7; above this range, differences were generally not significant. The incidence of root rot (*Meloidogyne* sp.) and of coarse root (*Pratylenchus* sp. and others) varied inversely with soil pH; differences were significant, especially for 1956. [Authors' abstract.]—Fla agric. Exp. Stats, Quincy and Gainesville.

2579. Haslam, R. J.
Soil management practices for burley tobacco.
Lighter, 1957, **27**(1): 9-10.

In experiments at the Experimental Farm, Harrow, Ont., the average yield of cigarette burley was higher following alfalfa than non-leguminous crops, but quality was somewhat lower. Quality was, however, improved when 230 lb. K_2O was added to the alfalfa after the last hay cut and the tobacco received the usual dressing of 1,200 lb. 5–10–5 fertilizer. F.Y.M. at 10 tons per acre also improved both yield and quality. In a modified rotation alfalfa ploughed in in Aug.–Sept. was followed by rye, which was in turn ploughed in preparation for tobacco; tobacco grown in this way got away to a better start and matured earlier.

2580. Gušterov, G. K.
The distribution of azotobacter in the rhizosphere of tobacco in the region of Stanke Dimitrov. [Bulgarian, with Russian and German summaries 1 p. each.]
Izv. bot. Inst. Sofia, 1956, **5**: 433-51, bibl. 18, illus.

It was found that the rhizosphere soil of tobacco during flowering harboured about twice as many azotobacter as the soil from the inter-rows. Regular applications of high rates of ammonium nitrate, apart from reducing the quality of tobacco, also reduced the number of azotobacter in the soil. FYM increased the number of azotobacter both within and without the rhizosphere. The presence of azotobacter in river water used for irrigation was confirmed.

2581. Mills, W. R.
Fertilizer trials with tobacco at Kigumba, 1952-54.
Rec. Invest. Uganda Dep. Agric. 1952/54, 1956, **4**, pp. 10-26, bibl. 1.

In a series of fertilizer trials with flue-cured tobacco on heavy soils at Kigumba N applications were not beneficial. The best results in one experiment were obtained with a 0–16–30 fertilizer. Applications of N and K with P to seedbeds resulted in a slightly reduced stand compared with P alone, but more vigorous plants were obtained with NPK.

2582. Chandnani, J. J., Rao, Y. J., and Khin, U. B.
The effect of nitrogen on different varieties of *Nicotiana rustica* tobacco.
Indian Tobacco, 1956, **6**: 129-35, bibl. 13.

In 2 years' trials on different sites 3 new varieties of *Nicotiana rustica* were supplied with organic N (nil, green manure [or 5 tons F.Y.M.] and 10 tons F.Y.M. per acre) and inorganic N (nil, 40 lb. and 80 lb. per acre). The best results were obtained with variety N.P.219 and 40 lb. N as sulphate of ammonia. There were varietal differences in response to inorganic N and also to root rot infection. A positive correlation was found to exist between weight per unit of leaf area and yield of cured leaf.—Indian agric. Res. Inst., New Delhi.

2583. Petrosini, G.
La concimazione del tabacco Virginia Bright in Umbria. (**Manuring of Virginia Bright tobacco in Umbria.**) [English summary ⅓ p.]
Tabacco, 1956, **60**: 355-85, bibl. 4.

Experiments lasting 2 years showed very low utilization of P by this variety, but production was increased by applying 500–1,000 kg. of superphosphate per ha. in addition to 200 kg. of potassium sulphate. Heavier P applications reduced both yield and quality. Further addition of 100 kg. of ammonium sulphate per ha. gave good quality leaf but made curing more difficult. The P of basic slag was less available than that of superphosphate.

2584. Welkie, G. W., and Pound, G. S.
Manganese nutrition of *Nicotiana tabacum* in relation to multiplication of tobacco mosaic virus.
From abstr. in *Phytopathology*, 1957, **47**: 36.

Tobacco plants grown in water culture under Mn-deficient conditions were stunted and developed interveinal chlorosis followed by complete chlorosis and necrosis. Virus-infected Mn-deficient plants exhibited less chlorosis than did non-infected Mn-deficient plants. Virus symptoms of Mn-deficient plants were less pronounced than those of plants receiving complete nutrient solutions. Assays of virus extracts showed up to 50% more virus per unit weight of tissue from Mn-deficient plants than from control plants. Uniform leaf discs of Mn-deficient plants, compared with control tissue, had a greater fresh weight, a lower dry weight and nearly 40% less total N. Leaf thickness of Mn-deficient plants was about 18% greater than that of normal plants, owing to the slightly enlarged and more loosely organized cells in the former.

2585. Oliver, J., and Sequeiros, J. M.
La acción de los oligoelementos sobre la planta de tabaco. 1. Primeros resultados obtenidos con boro en macetas y en campo. **(The effect of minor elements on tobacco plants. I. Preliminary results obtained with boron in pot and field experiments.)** [English summary ½ p.]
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 303-26, bibl. 34, illus.

The effects of boron, at rates of 0–60 kg. borax per ha., were studied on Valence Alto and Santa Fe tobacco plants grown in a calcareous soil. It was found that borated fertilizers could not be applied by the constant stream method as concentrations became toxic. Borated fertilizers applied in solution or broadcast with the base dressing were not toxic even at the highest rate. At non-toxic levels boron increased the height and leaf number of the plants. In pot experiments the maximum height was reached with 30 kg. borax and the maximum yield with 60 kg. borax per ha. In the field the maximum height was reached with 60 kg. borax per ha., but yields could not be recorded. —Inst. Biol. Tabac., Sevilla.

Physiology and biochemistry.

(*See also* 2025, 2088i, 2615a, f, k, l, q-s.)

2586. Lukpanov, Ž.
The photosynthetic activity of tobacco leaves. [Russian.]
Tabak, 1957, **18**(1): 54-5, bibl. 1.

Photosynthetic activity was measured in 5 pickings of tobacco leaves from Trapezond KV, Trapezond 161 and their hybrid, which produces 70% higher yield than the standard variety. In every case the leaves of the hybrid had a higher photosynthetic activity than those of the parent plants. Leaves of the earlier pickings, especially the upper leaves, showed the highest photosynthetic activity. Photosynthesis was highest between 8 and 11 a.m. and lowest between 2 and 5 p.m.

2587. Ducet, G., and Rosenberg, A. J.
Activités respiratoires chez les végétaux supérieurs. IX. Nouvelles recherches sur l'action de l'oxyde de carbone. **(Respiratory activity in higher plants. IX. New studies on the action of carbon monoxide.)** [Russian summary ⅓ p.]
Biohimija, 1957, **22**: 409-16, bibl. 17, illus.

The effect of CO on the respiration of leaves of tobacco grown in sand culture in natural light was studied, and the differences due to age and physiological condition of the leaves were noted.—Versailles Inst. Biol. phys.-chim., Paris.

2588. Harris, D. G., and van Bavel, C. H. M.
Nutrient uptake and chemical composition of tobacco plants as affected by the composition of the root atmosphere.
Agron. J., 1957, **49**: 176-81, bibl. 6.

With CO_2 in the root atmosphere increasing from 0 to 20%, the O_2 content was correspondingly reduced from 21 to 0%. In a further series without CO_2 the O_2 content was 10%, 15% or 21%. The plants were grown in sand culture with nutrient solutions containing radioactive Ca, P and K and were analysed for N, P, K, Ca and Mg. Uptake of nutrients was not significantly checked until oxygen in the root atmosphere was below 10%, when uptake of K was most markedly affected, with progressively slighter effects on N, P, Mg and Ca. Uptake of P, K and Ca, and probably also that of N and Mg, ceased in the absence of O_2. Concentrations of 5% and 10% of CO_2 stimulated P uptake. Foliar nicotine content decreased when CO_2 concentration was 5% and O_2 15%, but there was no further reduction at lower O_2 levels. Sugar content of leaves was increased by reduced root aeration. —N.C. agric Exp. Stat., Raleigh. [See also *H.A.*, 27: 1607.]

2589. Harris, D. G., and van Bavel, C. H. M.
Root respiration of tobacco, corn and cotton plants.
Agron. J., 1957, **49**: 182-4, bibl. 7.

Root respiration of tobacco in sand culture was greatly reduced when CO_2 in the root atmosphere was increased to 5% and O_2 reduced to 15% and when both these gases were at 10%. In the absence of CO_2, respiration was decreased at 10% of O_2 but not at 15%. Root respiration was more sensitive than absorption of water or nutrients to poor aeration. [See also *H.A.*, 27: 1607 and preceding abstract.] The respiration rate showed a daily maximum at 4 p.m. and a daily minimum between 2 a.m. and 10 a.m.

2590. Swaminathan, M. S., and Murty, B. R.
Use of radioactive tracers in the study of pollen tube growth.
Curr. Sci., 1957, **26**: 59-60, bibl. 3, illus.

Pollen from *Nicotiana rustica* and *N. tabacum* plants, which had stood for 3 days in a solution containing P^{32} or for 5 days in a solution containing S^{35}, was used to make reciprocal crosses, using untreated plants as the pistillate parents. The styles were collected 24, 48, 72 and 96 hours after pollination and autoradiographed. The style of *M. tabacum* is about 3 times as long as that of *N. rustica*, and it was found that the pollen of the latter only grew one third of the way down the style of *N. tabacum*. These observations were confirmed by style dissection. The dose of P^{32} or S^{35} had no adverse effect on the fertility of the pollen and normal capsules with viable seeds developed.—Indian agric Res. Inst., New Delhi. J.R.L.

2591. Pirie, N. W.
Macromolecular nucleoproteins from healthy tobacco leaves. [Russian summary 6 lines.]
Biohimija, 1957, **22**: 140-7, bibl. 18.

The microsome fraction made by ultracentrifuging extracts from healthy tobacco leaves contains ribonucleoprotein, ribonuclease, calcium and magnesium. Particles with varying composition can be made by ultracentrifuging from fluids of different compositions, and this affects the stability of the particles and the rate at which they autolyse. Plant virus preparations, made by gentle methods, contain similar particles. [Author's summary.]—Rothamsted exp. Stat.

2592. Tso, T. C., and Jeffrey, R. N.
Studies on tobacco alkaloids. I. Changes in nicotine and nornicotine content in *Nicotiana*.
Plant Physiol., 1956, **31**: 433-40, bibl. 18.

No pyridine alkaloids were found in the seeds of Robinson tobacco, while nicotinic acid and nicotine were detected in the seeds of *N. glutinosa*. The initial rate of nicotine synthesis was much higher in *N. glutinosa* than in Robinson tobacco. In young seedlings of both strains nornicotine was detected in the root as early as, or earlier than, in the shoot. From *N. glutinosa* seedlings to mature plants the nornicotine content per plant increased continuously, but nicotine increased and then decreased. No nicotine was detected in the leaves of over-mature, greenhouse-grown *N. glutinosa* during the last two weeks when the nornicotine increased by 62 and 103 mg. per plant weekly. There was little change of nicotine and nornicotine content in the root or stem at this time. All these results indicate that some nornicotine found in the root or in the shoot may not be formed from nicotine. In Robinson tobacco the conversion of nicotine to nornicotine is not accelerated to the same degree as a result of topping as is nicotine synthesis, thus the ratio of nornicotine to total alkaloid is lower in topped plants. In *N. glutinosa*, where the nicotine to nornicotine conversion system is strongly active even in immature plants, this system is not limiting even when the alkaloid content is increased greatly, due to topping and suckering. [From authors' summary.]—Univ. Md, College Park, and U.S.D.A., Beltsville, Md.

2593. Bausá Alcalde, M.
Estudios fisiológicos mediante la técnica del cultivo de raíces *in vitro*. Contribución al conocimiento de la formación de alcaloides en el género *Nicotiana*. (**Physiological studies on the technique of culturing roots *in vitro*. A contribution to the knowledge of the formation of alkaloids in the genus *Nicotiana*.**) [English summary 3 pp.]
Farmacognosia, 1956, **16**: 283-455, bibl. 74, illus.

Alkaloids were formed in root tissue cultures of *N. tabacum*, *N. glauca* and *N. sylvestris*. In the case of *N. tabacum*, a detailed study was made of the factors affecting root growth, nicotine production, and content and distribution of nitrogen.

2594. Giovannozzi, M.
Sul riferimento dei valori delle analisi chimiche dei tabacchi. (2ª Comunicazione.) **(The presentation of data from chemical analysis of tobacco. Second communication.)** [English summary ⅓ p.]
Tabacco, 1956, **60**: 347-54, bibl. 3.

Leaf-analysis data for total N, protein N and nicotine are presented as percentages of dry matter and as g. per sq. m. of leaf surface. The variations induced by topping or by fertilizer applications are not parallel in the two series of interpretations and in some instances are contradictory. The method of calculation based on surface area, originally used by Müller-Thurgau in 1885, is considered more logical and hence more satisfactory.

2595. Giovannozzi-Sermanni, G.
Variazioni nella composizione della foglia di tabacco Maryland in dipendenza della cimatura e dei metodi di cura. (**Variations in composition of leaves of Maryland tobacco as related to topping and methods of curing.**) [English summary ¾ p.]
Tabacco, 1956, **60**: 386-99, bibl. 8.

The Italian Benincasa and the American Catterton strain were compared. In both strains air curing of detached leaves increased soluble N and decreased protein N, total N remaining constant. Starch and sugars disappeared but other components were practically unchanged. Curing leaves still attached to the stalks led to greater loss of dry matter than curing of detached leaves, and to a decrease of both forms of N, with a slight increase of nicotine. Topping increased nicotine in both strains. In Catterton it increased total and protein N and decreased K, soluble N and starch. In Benincasa these results were reversed. Catterton is the better strain industrially.

2596. Giovannozzi-Sermanni, G.
Ricerche analitiche su *Nicotiana tabacum* con cromatografia su carta. V. Variazioni di alcuni componenti chimici, indotte dalla cimatura e dai sistemi di cura in tabacco Maryland. (**Paper-chromatographic analysis of *Nicotiana tabacum*. V. Variations induced in some chemical constituents by topping and by curing methods in Maryland tobacco.**) [English summary 1 p.]
Tabacco, 1956, **60**: 400-12, bibl. 8.

Sugars, amino acids and other organic acids were estimated in Maryland Catterton and Maryland Benincasa strains. Detailed tables of results are given, showing the effects of topping and comparing the effects of air curing whole plants with those of air curing detached leaves. Glucose and the number of free amino acids were reduced by topping. Except for traces of glucose, sugars disappeared during both systems of curing and asparagin replaced aspartic acid. [See also *H.A.*, 25: 736 and 26: 3876.]

Diseases and pests.

(*See also* 2275, 2569-2572, 2578, 2584, 2615c, g, j, m-p, t, v, w.)

2597. Pont, W.
Tobacco diseases in Queensland.
Qd agric. J., 1956, **82**: 635-40, 675-82, illus.

Blue mould, *Peronospora tabacina*, is the most serious tobacco disease in Queensland and causes heavy losses when it becomes epidemic. Fumigating the seed bed with benzol vapour under gas tight covers at night will control the disease. Mosaic, frog-eye leaf spot (*Cercospora nicotianae*), damping-off and stem rot fungi are also considered. J.R.L.

2598. Schmid, K.
Beobachtungen über die Virusübertragung im Tabakbau. (**Observations on virus transmission in tobacco growing.**)
Dtsch. Tabakb., 1956, **36**(23): 196-9, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/13.

Virus diseases were not transmitted by remnants of diseased plants in the soil. Brown rib virus was aphid-transmitted, and regular preventive spraying with a systemic insecticide is recommended. Secondary infection, in particular of *Thielavia*, occurred when diseased plant residues were added to the soil, and this reduced yields.

2599. Porter, C. A., and Weinstein, L. H.
Effect of thiouracil on tobacco plants infected with cucumber mosaic virus and on noninfected tobacco plants.
From abstr. in *Phytopathology*, 1957, **47**: 27.

Tobacco plants of the variety Vamorr 48 systemically infected with cucumber mosaic virus and comparable noninfected plants were grown in nutrient cultures containing 0, 3, and 5 p.p.m. of thiouracil and were examined for changes in major biochemical constituents. Thiouracil treatment was initiated 48 hours prior to inoculation with virus and was continued for 7 additional days. Clear-cut differences were produced by thiouracil treatment in both infected and noninfected plants. As the concentration of thiouracil was increased, the concentration in leaf tissues of nonketo acids of the Krebs cycle and of nucleic acids decreased, whereas that of free amino acids and of amides increased. In infected plants these changes were accompanied by a decrease in the amount of active virus.

2600. Hitchborn, J. H.
The effect of high temperature on the multiplication of two strains of tobacco ring spot virus.
Virology, 1957, **3**: 243-4, bibl. 7.

Tobacco plants systemically infected with one strain of tobacco ring spot virus and subsequently kept for 4 weeks at 36° F. were apparently freed of the virus, whereas another related strain of ring spot multiplied in the plants at this temperature.—A.R.C. Virus Res. Unit, Molteno Inst., Univ. Cambridge.

2601. Steinberg, R. A.
Production and prevention of frenching of tobacco grown in the greenhouse.
Plant and Soil, 1956, **7**: 281-9, bibl. 9.

Frenching was induced in tobacco plants grown in normal soil which had undergone partial steam sterilization and was associated with reduced acidity, low N and high P content of the soil. These conditions also led to high rhizosphere populations of *Bacillus cereus*, the probable causal organism. Symptoms of N deficiency were distinct from, and independent of, those of frenching. Acidification with sulphur and high nitrate reduced or prevented the frenching of plants, but did not eliminate the frenching capacity of the soil.—Agric. Res. Serv., U.S.D.A.

2602. Rossouw, D. J.
The control of powdery mildew in tobacco.
Fmg S. Afr., 1957, **32**(11): 27-8, illus.

The fungus causing tobacco powdery mildew, *Erysiphe cichoracearum*, was found to grow most rapidly at 23·5° C., but no development occurred at 5° and 25° C. Karathane, as a spray or dust, has given excellent control without affecting the smoking qualities of the tobacco.—Centr. Tob. Res. Stat., Rustenburg.

2603. Lautz, W.
Treatment of black root rot infested soil with Vapam, chlorobromopropene, and allyl bromide.
Plant Dis. Reptr, 1957, **41**: 174-6, bibl. 8, illus.

Five-gallon samples of soil infested with *Thielaviopsis basicola* were treated with allyl bromide at the rate of 3 gal. per 200 gal. water; Vapam (Stauffer N-869) (40% sodium N-methyl dithiocarbamate dihydrate) at 1/40, 1/100, and 1/200 gal.; and chlorobromopropene at 3 gal. per 100 gal. water. The black root rot disease was controlled effectively by all the chemicals at these concentrations and apparently eliminated by allyl bromide and by Vapam at the 2 stronger concentrations. [From author's abstract.]—Agric. Res. Serv., U.S.D.A.

2604. Trought, T. E. T.
Preliminary tobacco eelworm investigations, Uganda, 1952-1954.
Rec. Invest. Uganda Dep. Agric. 1952/54, **4**, 1956, pp. 73-87, bibl. 5.

A survey has shown that the tobacco root-knot nematodes (*Meloidogyne* spp.) are present throughout the tobacco growing areas of Uganda. In an experiment with D-D as a soil fumigant nematode infestations were reduced by treating seedbeds and/or field sites. The green leaf yield of tobacco was increased by about 75% and stand was also improved after seedbed treatment. Field-site treatment did not significantly increase yield. Seedlings heavily infested with nematodes showed a 26% reduction in growth. A rotation which included groundnuts, bulo [a millet?], maize, sorghum and resting under elephant grass, *Panicum maximum* or *Chloris gayana* would practically eliminate nematodes. [see also *H.A.*, 26: 798.]

2605. Todd, F. A., and Ferguson, J. C.
Soil fumigation for nematode control in tobacco.
Ext. Circ. N.C. agric. Ext. Serv. **402**, 1956, pp. 15, illus.

In North Carolina tobacco is attacked by 3 groups of nematodes, root-knot, meadow and stunt. In most fields two types are present and frequently all three occur together. Soil fumigation provides the only effective means of control. The recommended fumigants are D-D and EDB, but recent tests indicate that they are not equally effective against all three kinds of nematode. Both are effective against the root-knot nematode, but the meadow nematode is best controlled by D-D and the stunt nematode by EDB. Changing the fumigant from time to time may therefore be desirable. Instructions are given for applying the fumigants broadcast or along the rows, and the equipment available is described. Supplementary control measures are ploughing immediately after harvest and crop rotation.

2606. Viado, G. B., Punzalan, E. C., and Banaag, A. F.
Control of tobacco insects with organic insecticides.
Philipp. Agric., 1956, **40**: 361-77, bibl. 13.

Among 6 insects found feeding on tobacco the most destructive and abundant was *Heliothis armigera*, the others being *Prodenia litura*, *Phaneroptera furcifera*, *Plusia chalcytes*, *Oecanthus indicus* and *Gnorimoschema heliopa*. In field trials with 7 insecticides, applied 3 times at 2-week intervals and 6 times at 1-week and 10-day intervals, the best results, as measured by the amount of pest damage to the leaves, were given by DDT, endrin, toxaphene and dieldrin, but none of the treatments had a significant effect on yield. No phototoxicity was observed except for slight and short-lived scorching of young leaves by BHC. Laboratory tests of insecticides against individual pests are also recorded.

2607. Philip, A., and Joshi, B. G.
Some indications regarding the control of aphids on flue-cured tobacco.
Indian Tobacco, 1956, **6**: 125-6, illus.

In two trials aphid mortality amounted to 98 to 100% following 2 applications, at 10 to 20 oz. per acre, of endrin, Basudin and a 3 : 1 DDT-endrin mixture, with residual effects lasting from 2 weeks to at least 1 month. Nicotine sulphate caused 81% mortality. None of the sprays showed any adverse effects on the leaf.—Centr. Tob. Res. Inst., Rajahmundry.

2608. Scott, L. B.
Tests with new insecticides to control green June beetle larvae in tobacco-plant beds.
J. econ. Ent., 1956, **49**: 868-9, bibl. 7.

Several insecticides were tested in baits, dusts, and drenches for the control of larvae of the green June beetle, *Cotinis nitida*, in tobacco plant beds at Clarksville, Tenn., during the period 1945-1953. Parathion was the most effective insecticide tested. A 1% parathion dust at 1·5 lb./100 sq. yd. provided satisfactory control when night temperatures remained above 60° F. Similar results were obtained with baits and drenches containing parathion. Barium fluosilicate baits were moderately effective. Malathion, gasoline, DDT, D-D mixture, chlordane, lindane, endrin and TDE were toxic to the larvae, but less effective than parathion. Sabadilla, BHC, ryania, methoxychlor, and tetraisopropyl pyrophosphate were only slightly effective. [From author's summary.]—Agric. Res. Serv., U.S.D.A.

2609. Rabb, R. L., and Guthrie, F. E.
Tobacco hornworm control experiments in North Carolina, 1953-1955.
J. econ. Ent., 1956, **49**: 818-20, bibl. 1.

In tests conducted against *Protoparce sexta* in North Carolina during 1953-1955, endrin sprays were found to be faster in action than TDE, Strobane or toxaphene sprays, but all materials were equal in effectiveness 48 hours after treatment. Properly formulated endrin dusts were found as satisfactory as sprays. Cryolite dust was unsatisfactory. TDE sprays directed through one nozzle per row to the top of plants failed to control large larvae satisfactorily. [From authors' summary]—N.C. agric. Exp. Stat., Raleigh. [See also *H.A.*, 27: 1642.]

2610. Rabb, R. L., and Guthrie, F. E.
All-out attack against the tobacco hornworm.
Res. and Fmg N.C., 1957, **15**(3): 10-11, illus.

Sprays of spore suspensions of *Bacillus thuringiensis* have given excellent control of tobacco hornworm. Natural control by *Polistes* wasps may be encouraged by providing shelters for the wasps. By applying insecticide to plant tops before large larvae appear, good control is obtained with only a quarter of the insecticide needed for full coverage.

Curing and fermentation.

(*See also* 2559, 2615s.)

2611. Walker, E. K., and Vickery, L. S.
New features in flue-cured tobacco kiln construction.
Publ. Canada Dep. Agric. **989**, 1956, pp. 13, illus.

The alterations in kiln design discussed and illustrated in this bulletin cover several features relative to fire prevention measures, durable construction, and uniform curing. These features include a substantial footing, high foundation, controlled top and bottom ventilation, vestibule entrance, additional conditioning doors, protective screen and insulation. These innovations have been incorporated and tested in tobacco kilns for a number of years on the Tobacco Substation, Delhi, Ont. [From authors' introduction.]

2612. Asmaev, P. G., and Junošev, V. K.
The content of polyphenolic compounds in relation to the colour of tobacco. [Russian.]
Tabak, 1957, **18**(1): 43-4, bibl. 7.

The colour of flue-cured tobacco was lighter and the content of non-oxidised polyphenols, especially chlorogenic and caffeic acids, was higher than in air-cured tobacco of the same variety.

2613. Barrett, R. E.
Enzymes of bright and burley tobaccos.
J. agric. Food Chem., 1957, **5**: 220-4, bibl. 13.

Marked differences in enzyme activity were shown between unaged flue-cured tobacco (bright) and unaged air-cured (burley). Except for decarboxylases, the enzymes found in burley tobacco either were undetected or exhibited only slight activity in bright tobacco. Ageing of bright tobacco involves primarily chemical effects and ageing of burley tobacco possibly involves both chemical effects and enzymes. [From author's synopsis.]

2614. IL'IN, G. C.
Electric fermentation of tobacco. [Russian.]
Tabak, 1957, **18**(1): 37-41, bibl. 7.

When a 120-volt alternating current was passed periodically through bales between electrodes fermentation took 5–6 days with an after-fermentation process of 3 days, whereas fermentation at 40° C. took 22 days. Chemical changes in tobacco fermented by the 2 methods are compared and the advantages of the electric process, which include reduced losses in weight and lower cost, are discussed.

Noted.

2615.

a AKSU, S., AND ENERCAN, S.
Türk tütünlerinin kimyasal bileşim karekterleri. I. Karadeniz çevresi. (**The chemical composition of Turkish tobaccos. II. The Black Sea region.**) [French summary $\frac{1}{3}$ p.]
Tekel. Enst. Raporlari, 1956, **7**: 43-51, bibl. 9.
Nicotine ranged from 1·1 to 4·5% and protein N from 1·4 to 1·7%.

b AVRAMENKO, V. JA.
Mechanisation of tobacco topping. [Russian.]
Tabak, 1957, **18**(1): 52-3, illus.
Illustrated description of a tractor mounted appliance.

c BANCROFT, J. B., AND CURTIS, R. W.
A simple method using trichloroacetic acid for estimating tobacco mosaic virus concentration.
Phytopathology, 1957, **47**: 79-82, bibl. 11.

d BELANGER, J. A.
A study of the flue-cured tobacco soils of the Lavaltrie Substation.
Lighter, 1957, **27**(1): 11-15.
Typical of the flue-cured-tobacco soils of Quebec province.

e BENNETT, R. R., AND OTHERS.
Flue-cured tobacco varieties in North Carolina.
Ext. Circ. N.C. agric. Ext. Serv. **302**, revised 1956, pp. 23, illus.
Characteristics of 26 varieties described in detail.

f BOSE, B. C., DE, H. N., AND DALAL, J. H.
Micro-method for estimation of nicotine group of alkaloids in tobacco plants.
J. Indian chem. Soc., 1956, **33**: 131-4, from abstr. in *Analyt. Abstr.*, 1956, 3, No. 3742.

g CHAPMAN, R. A.
Reaction of species of *Nicotiana* to species of root-knot nematodes.
From abstr. in *Phytopathology*, 1957, **47**: 5.
Meloidogyne spp.

h DE COURNUAUD, R.
La fumure azotée du tabac dans la région Garonnaise. (**Nitrogen manuring of tobacco in Garonne district.**)
Rev. int. Tabacs, 1957, **32**: 37-9.
The results of a questionnaire on growers' practices discussed.

i GOPINATH, D. M., AND HRISHI, N. J.
Possibilities of wrapper tobacco cultivation in hill stations—a preliminary study.
From abstr. in *Indian Tobacco*, 1956, **6**: 128.
Quality at 3 out of 4 hill stations at 4,500 ft. encouraging.

j HAMERS-CASTERMAN, C., AND JEENER, R.
An initial ribonuclease-sensitive phase in the multiplication of tobacco mosaic virus.
Virology, 1957, **3**: 197-206, bibl. 20.
Multiplication of TMV inhibited by ribonuclease within 2 hours of inoculation but not later.

k HAMILL, R. L., BYERRUM, R. U., AND BALL, C. D.
A study of the biosynthesis of the methoxyl groups of lignin in tobacco plants.
J. biol. Chem., 1957, **224**: 713-16, bibl. 13.

l KEFFORD, N. P., AND HELMS, K.
Indoleacetic acid in two species of *Nicotiana*.
Nature, 1957, **179**: 679, bibl. 3.
In the leaves of *N. tabacum* and *N. sylvestris*.

m KLEIN, E.-K.
Über den Einfluss der Mineralsalzernährung auf den Gehalt des Blattes an freien Aminosäuren und Monosacchariden und seine Bedeutung für die Empfänglichkeit der Pflanze gegenüber parasitären Pilzen. I. Mitteilung. (**The influence of mineral nutrition upon the leaf content of free amino acids and monosaccharides and its significance for the susceptibility of the plant to parasitic fungi. 1st communication.**)
Bayer. landw. Jb., 1956, **33**: 224-41, bibl. 38.
As determined chromatographically in tobacco.

n KLINKOWSKI, M., AND SCHMELZER, K.
Beiträge zur Kenntnis des Virus der Tabak-Rippenbräune. (**Studies on "brown rib" virus of tobacco.**)
Phytopath. Z., 1957, **28**: 285-306, bibl. 23, illus.
A variant of potato virus Y; the variety V20 is immune.

o LAWSON, F. R., AND CHAMBERLIN, F. S.
Aphids on tobacco: how to control them.
Leafl. U.S. Dep. Agric. **405**, 1957, pp. 8, illus.
Myzus persicae; damage done and control with malathion or parathion.

p LORING, H. S., AND WARITZ, R. S.
Occurrence of iron, copper, calcium, and magnesium in tobacco mosaic virus.
Science, 1957, **125**: 646-8, bibl. 29.

q MIKHAILOV, M. K.
A study of polyphenols in tobacco by filter paper chromatography. I. Flavonic derivatives. [Russian summary 5 lines.]
C.R. Acad. bulg. Sci., 1956, **9**(2): 35-8, bibl. 18, illus.
Rutin, isoquercitrin and 3 unidentified glycosides. [See also *H.A.*, 27: 617k.]

r OLIVER, J., AND GALBIS, J. A.
La espectrofotometría de llama en el análisis de suelos y plantas de tabaco. 1. Métodos para sodio, potasio y calcio en hoja de tabaco. **(Flame spectrophotometry in the analysis of soils and tobacco plants. I. Methods for sodium, potassium and calcium in tobacco leaf.)** [English summary ⅓ p.]
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 255-93, bibl. 52.

s POGELL, B. M., AND OTHERS.
Protein changes during curing of burley tobacco, and pectin methylesterase of cured leaf.
J. agric. Food Chem., 1957, **5**: 301-4, bibl. 15.

t POWELL, N. T., AND NUSBAUM, C. J.
Pathogen-suscept relations of *Phytophthora parasitica* var. *nicotianae* in *roots* of certain tobacco varieties and *Nicotiana* species.
From abstr. in *Phytopathology*, 1957, **47**: 27-8.

u SCARASCIA, G. T.
Energia atomica ed agricoltura. Panorama delle attuali applicazioni. **(Atomic energy and agriculture. Survey of present-day applications.)**
Ital. agric., 1955, **92**: 727-37, illus. [received 1957].
Including responses of tobacco to slow-neutron seed treatment.

v VILLAMIZAR J., A.
El mosaico del tabaco. **(Tobacco mosaic.)**
Acta agron. Palmira, 1956, **6**: 189-224, bibl. 69.
A review.

w WHELLAN J. A.
Pests of stored tobacco.
Rhod. Fmr, 1957, **27**(49): 43-4, illus.
The cigarette beetle, prevention and control.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 2671i, 2847, 2848.)

2616. GHISLENI, P. L.
Osservazioni sulla maggiorana (*Origanum majorana* L.) in veste di pianta coltivata. **(Observations on marjoram (*Origanum majorana*) as a cultivated plant.)**
Nuovo G. bot. ital., 1954, **61**: 249-55 [received 1957].

Seeds germinated between 6 and 30° C., the optimum being 16–17° C., irrespective of illumination. Cultivation of marjoram in Italy is discussed.—Univ. Studi, Torino.

2617. GHISLENI, P. L.
Rilievi biometrici sul timo comune (*Thymus vulgaris* L.). **(Biometrical observations on thyme (*Thymus vulgaris*.).)**
Nuovo G. bot. ital., 1955 (issued 1956), **62**: 547-9.

Of the various plant characteristics examined statistically, length of leaves was the only one definitely related to seed colour, dark seed giving longer leaves than light seed.

Drug plants.

(*See also* 2671e, f, h, i, m, o, 2672a, b, f, l.)

2618. HAYCOCK, R. P., AND MADER, W. J.
Pharmaceuticals and related drugs.
Analyt. Chem., 1957, **29**: 697-713, bibl. 567.

This review covers the literature for 1955–56 on analytical procedures for alkaloids, amino acids and related compounds, antibiotics, glycosides, steroids, sugars and other carbohydrates, vitamins, and various other groups of compounds.

2619. KAPOOR, L. D., AND OTHERS.
Cultivation of *Chenopodium ambrosioides* in Jammu and Kashmir.
J. sci. industr. Res., India, 1956, **15A**: 35-8, bibl. 4.

Seeds of *Chenopodium ambrosioides* var. *anthelminticum*, obtained from Turkey, produced satisfactory crops at Jammu (900 ft.) and Katra (3,000 ft.), the dried fruit yielding 0·75 and 1·15% oil containing 69·5 and 66·4% ascaridole. At Srinagar (5,000 ft.) and Yarikah (7,000 ft.) growth was stunted. In a time-of-harvesting trial at Jammu the percentage of oil in the plants remained fairly constant from the time the flower buds appeared until the fruits were ripe, but the percentage of ascaridole in the oil increased markedly as the fruits ripened. A further increase in ascaridole, from 69·9 to 75·5%, occurred when plants harvested in August were allowed to grow again and were harvested a second time in December. Suggestions are made on methods of cultivation and distillation in the light of the encouraging results so far obtained.—Drug Res. Lab., Jammu.

2620. BHATTACHARJI, S., AND SHARMA, V. N., AND DHAR, M. L.
Chemical examination of the roots of *Cissampelos pareira* Linn.
J. sci. industr. Res., India, 1956, **15B**: 363-8, bibl. 10.

Roots of *C. pareira* from Kashmir yielded two alkaloids, hayatin (0·65%) and hayatinin, and *d*-quercitol. By contrast, roots obtained from Pilibhit, U.P., yielded less hayatin (0·15%) and contained *l*-bebeerine (0·33%) but no hayatinin or *d*-quercitol. Samples from both areas contained an essential oil (0·2%), a fixed oil (3·4%) and a sterol. The methiodide of hayatin has been found to possess powerful neuromuscular blocking properties.—Centr. Drug Res. Inst., Lucknow.

2621. TALLARICO, G.
Avvenire della liquerizia. **(Liquorice, the plant of the future.)**
Riv. int. Agric., 1956, **1**(10-11): 25-7, illus.

A Dutch medical pundit speaking at an International Congress of Specialists in Internal Diseases is reported to have stated that the humble liquorice plant, *Glycyrrhiza* spp., contains an all important principle, a steroid called glycorrhizinic acid, analogous to cortisone. In addition Tallarico stresses its traditional use for gastric ulcers and as a sedative like belladonna.

2622. GRUŠVICKIJ, I. V.
Methods for accelerating the germination of ginseng seeds. [Russian.]
Bot. Žurnal, 1956, **41**: 1021-3, illus.

Ginseng [*Panax* sp.] cultivation is to be introduced shortly into the U.S.S.R. Propagation is by seeds, which, however, germinate very slowly, usually after the second winter following harvest. To hasten germination the seeds should be kept in sand at 20° C. for 3½–4 months and then at 2–4° C. for 3–4 months. Methods of treatment are described.

2623. STEUBING, L. (AND BÖHME, E.).
Untersuchungen über die Konkurrenzwirkung von Gehölzwurzeln auf Ackerkulturen. Der Einfluss von Eichen als Standbaüme in Hecken. **(Studies on competition between tree roots and field crops. The effect of oaks as hedgerow trees.)** [English summary ⅜ p.]
Plant and Soil, 1955, **7**: 1-25, bibl. 19, illus. [received 1957].

The effects of oaks on soil conditions, microclimate, weed flora and plant growth are analysed for various field crops and opium poppies.

2624. MUKERJI, B.
Psoralea and other indigenous drugs used in leucoderma.
J. Sci. industr. Res. India, 1956, **15A** (No. 5, Suppl.): 1-12, bibl. 62.

Most of this article is devoted to a description of *Psoralea corylifolia*, its botanical, and pharmacognosial features, the preparation of its active principles, the pharmacological properties of its essential oil and its therapeutic uses. Other plants containing psoralens discussed in rather less detail are *Ammi majus*, *Luvanga scandens*, *Aegle marmelos*, *Angelica archangelica* and *Ficus carica*.

2625. CHANDRA, V.
Studies on *Rauvolfia*.
J. sci. industr. Res. India, 1956, **15A**: 125-33, bibl. 15, illus.

A general description of the *Rauvolfia* genus is followed by a list of species known to occur in different named parts of the world [see also *H.A.*, 27: 623]. Then comes a detailed, illustrated description of *R. serpentina*, its cultivation, diseases, pests and storage. The most common adulterant is *R. canescens*, which is described and differentiated from *R. serpentina*.—Nat. bot. Gdns, Lucknow.

Essential oils.

(*See also* 2647-2649, 2654, 2671a, b, n, t, x, 2742-2745, 2758, 2762n, 3022.)

2626. CARROLL, M. F.
The Commonwealth as a source of essential oils.
J. roy. Soc. Arts, 1955, **103**: 689-701, bibl. 8, illus.

Information is given on production values of essential oils in the Commonwealth, the principal oils and their uses, processing, isolates from essential oils, factors affecting production and sale, and future prospects in the Commonwealth.

2627. GREŠNYH, B. A.
The effect of short days during the raising of seedlings on the yield of *Ocimum gratissimum*. [Russian.]
Kratkij Otčet o nauč-issled. Rab. za 1954 vses. n.-i. In-ta masljč. i efiromasljč. Kuljtur, Krasnodar, 1955, pp. 307-10, from abstr. in *Ref. Ž(Biol.)*, 1956, No. 22, abstr. 95133.

Experiments in 1953–1954 showed *Ocimum gratissimum* to be a short-day plant, and raising seedlings under short-day conditions hastened early development and increased the yield of green matter and seed. It is recommended that seedlings be grown for 15 days in frames covered from 4 p.m. to 8 a.m.

2628. DIMITROVA, E., STAIKOV, V.[M.], AND ZOLOTOVICH, G.
Studies on *Pelargonium roseum* Willd. in Bulgaria. [Russian, with English summary 5 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(4): 33-6, bibl. 4.

In the tropics and subtropics *P. roseum* is cultivated as a perennial, but in Bulgaria it can be grown only as an annual. Propagation is by cuttings which overwinter in heated frames. The yield of both green matter and essential oil is considered satisfactory and the quality of the oil good. In 3 years' trials yields of oil ranged from 1·17 to 3·52 kg. per dekar [$\frac{1}{10}$ha.].

2629. STAIKOV, V., PANAYOTOV, I., AND BORISOV, G.
Bulgarian juniper oil. [Russian summary 5 lines.]
C.R. Acad. bulg. Sci., 1956, **9**(1): 59-62, bibl. 1.

Tests on the extraction of essential oils from the berries of *Juniperus communis* showed that water+steam distillation was the most suitable method, giving a higher yield than water distillation and a milder odour than steam distillation. The characteristics and composition of oils from the 1954 and 1955 crops differed appreciably, due most probably to differences in the length of the storage period before distillation.

2630. IKEDA, N., AND NAKAMURA, M.
Effects of various treatments on the germination of mint seeds. I. [Japanese, with English summary ½ p.]
Sci. Rep. Fac. Agric. Okayama Univ., 1956, No. 9, pp. 39-45.

Storage of mint seed under moist, low temperature conditions for 5 months proved very effective in inducing germination, a temperature varying from 20 to 30° C. proving better than one of 20° or 25° C. Further daily alternations of temperature, especially of 15° C. for 16–20 and 30° C. for 8–4 hours, also brought about better germination than when constant temperatures were maintained. The germination percentage of seeds placed on a germinator moistened with dilute solutions (0·005–0·01 N) of H_2SO_4 and KNO_3 was higher than that obtained with distilled water.

2631. Maciejewska-Potapczykowa, W., and Kamińska, T.

Wpływ moczenia sadzonek w roztworach amidu kwasu α-naftylooctowego na zawartość i jakość olejku u *Mentha piperita* L. (**The effect of soaking *Mentha piperita* seedlings in alpha-naphthylacetamide on the content and quality of essential oil.**) [English and Russian summary 6 lines each.]

Roczn. Nauk rol., Ser. A, 1956, **74**: 111-16, bibl. 3.

Soaking seedlings of *Mentha piperita* before transplanting in α-naphthylacetamide at concentrations of 10^{-4} and 10^{-5} increased the essential oil content of the leaves by 29 to 46% and the menthol content of the oil by 4·5 to 9% as compared with the controls. The lower concentration of the growth substance was somewhat more effective than the higher.

2632. Baird, J. V.

The influence of fertilizers on the production and quality of peppermint in central Washington.

Agron. J., 1957, **49**: 225-30, bibl. 23.

Plants fertilized with N produced marked increases in hay and oil yield in 1952 and 1953. Small increases in yield occurred on P fertilized plots. Both K and S fertilization had negligible effects on yield. Plant parts high in N as a result of N fertilization were lower in P, slightly higher in K, and somewhat lower in Ca than in plants low in N. P, K, and S fertilization influenced plant nutrient content to a lesser extent than did N fertilization. Leaf N was shown to be considerably more important than leaf P in predicting yield. Menthol and menthofuran accounted for 76% of the variation in optical rotation of the oils in 1953. Menthol was approximately 1·5 times as important as menthofuran in determining optical rotation in 1953. The menthol content of peppermint oil was inversely related to total leaf N for both years, and was directly related to leaf P in 1952. Leaf N was slightly more effective than leaf P in predicting menthol content. There was significant positive correlation of leaf N and significant negative correlation of leaf P with menthofuran content in 1953. Leaf N was approximately three times as effective as leaf P in predicting menthofuran content. [From author's summary.]—Wash. St. agric. Exp. Stat., Pullman.

2633. Dodov, D. N., Dimitrova, E., and Zolotovich, G.

Curl—a virus disease of peppermint. [Russian summary 6 lines.]

C.R. Acad. bulg. Sci., 1956, **9**(2): 47-50, bibl. 5, illus.

The disease observed on *Mentha piperita* in Bulgaria was found to be transmitted by grafting but not by sap inoculation or aphids. Yields of both green matter and essential oil were lower in diseased than in healthy plants, but the quality of the oil was not affected appreciably.

2634. Ross, J. P.

Free amino acids and amides in healthy and *Verticillium*-infected peppermint and chrysanthemum plants.

From abstr. in *Phytopathology*, 1957, **47**: 29.

The free amino-acids were determined in leaf and stem extracts of healthy peppermint and chrysanthemum plants and of plants inoculated with *Verticillium albo-atrum*. In chrysanthemum, infected leaves contained much more proline than healthy leaves, whereas infected stems contained markedly less amide N than healthy stems. In infected mint stems there was a shift from glutamine to asparagine with no large change in total amide N. The total soluble amino acid N of infected mint stems was 3 times that of healthy stems 13 days after inoculation. Pipecolic acid was detected in the stems of infected mint 10 days after inoculation and in leaf tissue 7 days later; it was never detected in healthy mint plants. Lysine, but not pipecolic acid, was found in mycelium of *V. albo-atrum* cultured in Coon's medium. Pipecolic acid was detected in healthy mint cuttings into which lysine was introduced. This suggests that lysine produced by the fungus may be transformed into pipecolic acid by the metabolic activities of the host plant.

2635. Jensen, H. J., and Horner, C. E.

Peppermint decline caused by *Longidorus sylphus* can be controlled by soil fumigation.

From abstr. in *Phytopathology*, 1957, **47**: 18.

To control *Longidorus sylphus* on peppermint in Oregon, nematocides and fungicides were injected into the soil or applied to the surface and worked in before planting. Growth of transplanted cuttings was used to estimate the amount of control. On some of the treated plots plants made approximately 16 times more growth than the controls. The best growth was made on plots treated with D-D injected at 50 gal. per acre, Nemagon injected at 3 gal. per acre, and EDB injected at 7 gal. per acre. [For earlier work see *H.A.*, 27: 1660.]

2636. Kubota, T., and Matsuura, T.

The constitution of myoporone, a new furano-terpene from *Myoporum*.

Chem. Ind. Lond., 1957, No. 16, pp. 491-2, bibl. 7.

In the essential oil of *Myoporum bontioides* ngaione, a major constituent in other *Myoporum* oils, only occurs in small quantities and, instead, myoporone is the major constituent, amounting to about 0·2% of the weight of undried leaves. The present paper is concerned with the structure of this compound.—Inst. Polytech., Osaka City Univ., Japan.

Fibres.

(*See also* 2668, 2671c, j, 2672e, i-k, 2853, 2993z, 3021, 3024a.)

2637. Betrabet, S. M.

Fibre-yielding Malvales of Bombay.

J. sci. industr. Res. India, 1956, **15C**: 146-8, bibl. 8.

The physical and chemical characteristics of the fibres of *Malachra capitata*, *Abutilon indicum*, *Hibiscus tetraphyllus* and *Urena lobata* compare favourably with those of jute. They are discussed.—Inst. Sci. Bombay.

2638. González Gómez, C., Gallego y Gómez, F., and Swiatopolk-Mirski, A.
Contribución al estudio de los *Dasylirion* como plantas fibrosas. **(A contribution to the study of *Dasylirion* as fibre plants.)** [French and English summaries ⅓ p. each.]
Farmacognosia, 1956, **16**: 267-81, bibl. 5, illus.

Four species of *Dasylirion* were studied with a view to finding a new fibre plant capable of adaptation to the dry central plateau of Spain. *D. longifolium* was found to grow well and produce high yields of good quality fibre.

2639. Matusiewicz, E.
Krytyczna długość dnia w przechodzeniu stadium świetlnego u donopi na podstawie faz rozwojowych. **(Photoperiodic responses of hemp in relation to vegetative and reproductive phases.)** [English and Russian summaries 1¼ p. each.]
Roczn. Nauk. rol., Ser. A, 1955, **72**: 39-54, bibl. 10.

Three varieties of hemp were grown at 6 different day lengths, ranging from 13 to 15 hrs 30 mins., for 30 days starting 7 days after emergence. The shorter photoperiods resulted in earlier initiation of the reproductive phase. The photoperiod which was critical for flower initiation varied between varieties and sexes, being shorter for the female plants.

2640. Brewbaker, J. L., and Umali, D. L.
Classification of Philippine Musae I. The genera *Musa* L. and *Ensete* Horan.
Brewbaker, J. L., Gorrez, D. D., and Umali, D. L.
Idem. II. Canton and Minay, putative hybrid forms of *Musa textilis* Nee and *Musa balbisiana* Colla.
Brewbaker, J. L., and Gorrez, D. D.
Idem. III. (A) Saguing maching (*Musa banksii* F.V.M.). (B) Alinsanay, a putative hybrid of *M. textilis* and *M. banksii*.
Philipp. Agric., 1956, **40**: 231-41, illus., 242-57, illus., and 258-68, bibl. 43, illus.

The authors have attempted to clarify ambiguities existing in the nomenclature of *Musa* species and hybrids and to establish a foundation for more intensive taxonomic and hybridization studies incident to the rapidly expanding co-operative Manila hemp improvement programme in the Philippines.

2641. Carañgal, V. R., and Carañgal, A. R., Jr.
The relation between mosaic resistance and some biochemical properties of the plant sap of abacá and its relatives.
Philipp. Agric., 1956, **40**: 303-13, bibl. 11.

The pH of aqueous extracts of the leaves and colour reactions for tannins or polyphenols cannot be used as indications of resistance to abacá mosaic virus. In preliminary experiments mosaic-infected plants appeared to have a lower pH and more polyphenols than healthy plants.

2642. Reyes V., M.
Estudio comparativo de fungicidas en el control de la mancha de la hoja del abacá en Tingo María. **(Comparative trials with fungicides for control of leaf spot of Manila hemp in Tingo María.)**
Bol. trim. Exp. agropec. P.C.E.A., Lima, 1956, **5**(2): 2-5.

Bordeaux mixture at 1%, Dithane Z-78 at 1·5 lb./100 gal. and Cupravit at 2 lb./100 gal. were compared for control of leaf spot on Manila hemp, caused by *Helminthosporium torulosum* and *Cordana musae*. They were applied 3 times at 10-day intervals starting 20 December. All treatments gave significant control compared with the untreated plots, Dithane giving significantly better control than Cupravit.—Agric. exp. Stat., Tingo María.

Hops.

(*See also* 2342g, 2349.)

2643. D.S.I.R., N.Z., and Cawthron Institute.
Hop research. Annual Report for 1955-56, 1956, pp. 2.
Cawthron Institute.
Hop research.
A.R. Cawthron Inst. 1955/56, 1956, pp. 17-21.

A method of reducing the incidence of black root rot by altering the manurial mixture has been successfully introduced. Meantime, breeding to produce a resistant variety satisfactory in other respects continues. Training systems, manuring and disease control are under investigation. Chemical studies concern boron, molybdenum and time changes in chemical content. The second report provides a rather fuller résumé of the work on manuring, diseases, chemistry and drying, supplemented in some cases by separate papers [see abstracts below].

2644. Wilson, J. F.
Whitbread's Golding Variety hop: A note on wilt tolerance in the field and the establishment of a *Verticillium*-free planting stock.
A.R. E. Malling Res. Stat. 1956, 1957, **A40**: 128-30, bibl. 4, illus.

Field studies of Whitbread's Golding Variety grown under commercial conditions in different localities show the wilt tolerance of the variety to be satisfactory and comparable with that of Keyworth's Mid-season. A stock of the variety shown by test to be free from *Verticillium* has been established and distributed to commercial propagators. [Author's summary.]

2645. Askew, H. O., and Watson, J.
Molybdenum deficiency in hops.
A.R. Cawthron Inst. 1955/56, 1956, pp. 45-7.

In the early stages of what is thought to be Mo deficiency the leaf blades show a brown speckling which later turns white. These areas may fall out of the leaf. Upward or downward incurling of the leaves occurs, affected leaves being smaller and of a lighter green and being found only on the main bines. Flowering is not suppressed and a fair crop of apparently normal cones may be borne. During early spring affected plants may have chlorotic shoots. Appropriate treatment with molybdate was followed by increased Mo in the leaves and improved health.

2646. Askew, H. O., and Monk, J. R.
Physical and chemical changes during development of the hop cone.
A.R. Cawthron Inst. 1955/56, 1956, pp. 40-1.

The authors discuss the large changes in size and dry matter content which occur in the hop during development. Further, they trace the all-important increase in resin content over the same period.

2647. Howard, G. A.
Evaluation of hops. V. The essential oil of hops.
J. Inst. Brew., 1956, **63**: 126-38, bibl. 16.

The aromatic constituents of hops have been analysed by gas chromatography. The essential oil comprises a mixture of hydrocarbons and of oxygenated materials, these two main fractions being readily separated by chromatography on silica gel. The hydrocarbons, which account for 70–80% of the total oil, comprise mainly myrcene, caryophyllene and humulene in proportions varying according to the source. The more complex oxygenated fraction contains considerable amounts of esters of at least 12 fatty acids—both straight and branched chain—containing 4 to 10 carbon atoms. As this oxygenated material distils very rapidly in steam it is likely to be absent from beer prepared according to normal hop-boiling conditions. [Author's abstract.]—Brew. Ind. Res. Found., Nutfield, Surrey.

2648. Rigby, F. L., and Bethune, J. L.
Analysis of hop oil by gas-liquid partition chromatography.
J. Inst. Brew., 1957, **63**: 154-61, bibl. 14.

Apparatus for analysis of hop aromatic oil by gas-liquid partition chromatography is described, and analyses are reported for the principal components in the oils from commercial samples of 16 varieties of hops. Distinct peaks are obtained for as many as 13 components in the whole oil, but chromatography of the oxygenated fraction alone indicates that many additional components are present in small amounts. Myrcene and humulene comprise 70–80% of most oils, but methyl nonyl ketone and two other compounds, believed to be β- and γ-caryophyllene, are present in substantial quantities. Analyses of the α-acid fractions of these hops are also reported, and a highly significant correlation has been found between the myrcene content of the oil and the cohumulone content of the α-acid fraction, and also between the humulene content of the oil and the humulone content of the α-acid fraction. Oils from Continental European hops generally have a low myrcene and high humulene content, while the reverse is true of North American hops. [Authors' abstract.]—Canad. Breweries Res. Div., Toronto.

2649. Howard, G. A., and Slater, C. A.
Hydrocarbons of the essential oil of hops.
Chem. Ind. Lond., 1957, No. 16, pp. 495-6, bibl. 6.

Chromatographic separation of the hydrocarbons of hop oil from different varieties indicates that these comprise, not merely 3 or 4, but about 20 compounds, the proportions of each varying with the variety of hops examined.—Brew. Ind. Res. Found., Nutfield, Surrey.

2650. Howard, G. A., and Tatchell, A. R.
Evaluation of hops. VI. Influence of variety on the composition of the α- and β-acids.
J. Inst. Brew., 1957, **63**: 138-42, bibl. 10.

The proportions of cohumulone in the α-acid and of colupulone in the β-acid, as determined for a wide range of hop varieties, suggest that these proportions are primarily inborn characteristics and are affected by environment only to a minor extent. The ratio of colupulone in β-acid to cohumulone in α-acid is approximately constant. The flowers from the male hop contain humulone and lupulone together with their analogues. The co-fraction proportions again appear to vary with variety and, furthermore, the percentage of cohumulone in α-acid is related to that of colupulone in β-acid in the same way in both male flowers and female cones. [Authors' abstract.]—Brew. Ind. Res. Found., Nutfield, Surrey.

2651. Kříž, J.
Šedavka luční jako škůdce chmele v roce 1955. ***(Hydroecia micacea* as a hop pest in 1955.)** [English, Russian and German ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 1163-74, bibl. 13, illus.

Wilting and drying off of young hop shoots and bines was found to be due to caterpillars of *Hydroecia micacea* feeding on the roots and base of plants. The damage was especially severe in neglected gardens in damp, sheltered valleys. For control, weed destruction, the provision of reserve bines and the pulling up of wilted ones and chemical methods are recommended. Among chemicals tried BHC dust applied immediately after pruning in April either broadcast at 50 kg./ha. or around the hills at 15–20 kg./ha. gave the best results.

2652. Askew, H. O., and Monk, J. R.
Experiments on drying of hops.
A.R. Cawthron Inst. 1955/56, 1956, pp. 42-4.

The authors conclude from their trials that the rate of loss of water and the variations in the moisture content of the cones during drying follow somewhat the same pattern as that in flue curing tobacco. On the other hand during the more intense drying of the hop the enzyme systems concerned in respiration cease to function, hence there is almost no loss of dry matter during hop processing. Experiment is still necessary to determine the best conditions of temperature and relative humidity of the air used for drying, and whether the CO_2 evolved by respiration in the earliest stages of drying may not exert some protective action in preventing oxidative changes in the hop cones.

Insecticidal plants.

(*See also* 2671g, 2672d, g.)

2653. Dixit, R. S., Perti, S. L., and Ranganathan, S. K.
Evaluation of *Acorus calamus* Linn.—an insecticidal plant of India.
J. sci. industr. Res. India, 1956, **15C**: 16-23, bibl. 8.

A consideration of its effect leads to the conclusion that extracts of *A. calamus* will be more expensive than DDT, lindane and pyrethrins, but that in times of emergency its properties may prove useful as a substitute for those insecticides.—Tech. Devel. Estab. Lab., Kanpur.

2654. Dhingra, S. N., and Dhingra, D. R.
Essential oil of *Tagetes patula.*
Perfum. Essent. Oil Rec., 1956, **47**: 391-4, bibl., from abstr. in *Trop. Abstr.*, 1956, **11**, No. d3389.

All parts of the plant of *Tagetes patula* contain an essential oil, readily extracted by steam distillation. The plants and the oil, which has a pronounced odour, have been found to repel flies. Analytical data are given on oil from the leaves, flowers and stems.

Plant sources of antibiotics.

(*See also* 2671x.)

2655. Scharpenseel, H. W., Rubic, R. R., and Rabe, R. B.
Preliminary studies on anti-bacterial principles in flowering plants.
Araneta J. Agric., 1956, **3**(2): 46-53, bibl. 9, illus.

The expressed sap of 22 plant species was tested against 3 species of bacteria. The leaf sap of *Bignonia purpurea*, *Moringa oleifera*, *Rosmarinus officinalis* and *Samanea saman* and the seed sap of *Carica papaya* exhibited strong antibiotic effects.

2656. Chauvin, R., and Lavie, P.
Recherches sur la substance antibiotique du pollen. **(Investigations on the antibiotic substance in pollen.)**
Ann. Inst. Pasteur, 1956, **90**: 523-7, from abstr. in *Bee World*, 1957, vol. **38**, abstr. 119/57.

Antibiotic activity against strains of bacteria was displayed by extracts, prepared with alcohol or boiling water, from pollen of *Castanea*, *Cistus*, *Erica arborea*, maize and dandelion, but not by extracts from pollen of poppy (*Papaver rhoeas*), *Prunus*, *Salix* or fruit trees.
J.R.L.

2657. Topps, J. H., and Wain, R. L.
Fungistatic properties of leaf exudates.
Nature, 1957, **179**: 652-3, bibl. 3.

The effects are recorded of ether-extracted washings of leaves of 14 tree species on spore germination and germ tube length of *Botrytis cinerea*. All extracts examined showed some degree of fungistatic activity, the most potent being those obtained from elder and privet. It is suggested that the solution of compounds from the leaf which would be present under natural conditions in the film of moisture on its surface might be a defence mechanism against fungal attack.—Wye College, Kent.

2658. Spencer, D. M., Topps, J. H., and Wain, R. L.
An antifungal substance from the tissues of *Vicia faba.*
Nature, 1957, **179**: 651-2, bibl. 4, illus.

The fungistatic compound described was found to be active against *Botrytis fabae*, *Alternaria solani* and *Monilia fructigena*. Some evidence has been obtained which suggests that the antifungal substance may not be present as such in intact bean plants, but that it is produced in the tissues in response to a wound stimulus. This raises the question whether slight damage to cells brought about by the penetration of the germ tube of a fungal spore might be sufficient to initiate the formation of this compound.—Wye Coll., Kent.

Seed oils.

(*See also* 2671d, l, q, s, u, w, y, 2672c, h, 3017.)

2659. Poliakoff, J.
Les oléagineux du Brésil. **(Oil plants of Brazil.)**
Oléagineux, 1957, **12**: 171-8, bibl. 37, illus.

Naturally occurring palms include *Astrocaryum* spp., *Attalea* spp., *Orbygnia speciosa*, *Elaeis guineensis* and coconut. Other native oil plants include *Licania rigida*, *Carapa* sp., Brazil nut (*Bertholletia excelsa*), *Virola senifera*, *V. surinamensis*, *Erisma calcaratum*, cashew nut, hevea and cacao. Notes are provided on the plants and data tabulated on production and exports. [See also *H.A.*, 27: 670g.]

2660. Sarkar, S., and Chakrabarty, M. M.
The chemical examination of the seed fats from *Bischofia javanica* Blume and *Antidesma diandrum* Roth. Seed fats of the *Euphorbiaceae* family—Part II.
Sci. and Cult., 1956, **22**: 336-7, bibl. 4.

Seed fat from *B. javanica* shows promise as a raw material in surface-coating industries. Oil yield from *A. diandrum* is low, and the seeds are difficult to process.—Univ. Coll. Tech., Calcutta. [For part I see *H.A.*, 26: 2948t.]

2661. Zimmerman, L. H.
The relationship of a dwarf-internode gene to several important agronomic characters in castorbeans.
Agron. J., 1957, **49**: 251-4, bibl. 2, illus.

The dwarf-internode gene was found to be inherited independently of node of first raceme, total number of nodes, dehiscence of the capsules, and the genes for monoecious or pistillate racemes. The results of the study indicate that a reduction of plant height in commercial castor bean varieties may be feasible through the utilization of the dwarf-internode gene. [From author's summary.]—U.S.D.A. and Univ. Calif., Davis.

2662. Beevers, H.
Utilization of glycerol in the tissues of the castor bean seedling.
Plant Physiol., 1956, **31**: 440-5, bibl. 12.

Non-green cotyledons excised from young germinating seedlings of castor bean have been shown to metabolize glycerol-C^{14} actively under aerobic conditions. About one quarter of the supplied glycerol was oxidized to $C^{14}O_2$ by a sequence which apparently involved glycolytic intermediates, pyruvic acid and the Krebs cycle. A large fraction of the remainder of the glycerol was found in sucrose isolated from the tissue, and degradation showed that the glycerol carbon skeleton had been incorporated intact, as would be required if the glycerol was first converted to triosephosphate and then subjected to the action of aldolase. The effects of 2,4-dinitrophenol on this system are described, and the interpretation put on these results is that the extent to which synthesis of sucrose from glycerol occurs is governed by the rate of glycolytic utilization of triose-phosphate, which is itself regulated by the aerobic phosphorylations in the tissue. [Author's summary.] —Purdue Univ., Lafayette, Ind. [See also *H.A.*, 26: 865c.]

2663. Castellani, E.
Esperienze di lotta contro i tumori batterici del ricino a mezzo di applicazioni locali di una sostanza antibiotica. **(Experiments on control of bacterial tumours of castor bean plants by local application of an antibiotic substance.)**
Olearia, 1956, **9**: 210-12, bibl. 14, illus.

Tumours caused by *Bacterium tumefaciens* on young castor bean plants were reduced to dark brown necrotic patches by the application of cottonwool pads soaked in culture fluid from *Oospora virescens* containing 100 *Botrytis* units of active principle per c.c. The surrounding surface tissues were only slightly discoloured and were unharmed by contact with the dressings, which remained in place for 8 days, covered with cellophane. There was no recurrence of symptoms in treated plants.—Ist. Pat. veg. Univ. Torino.

2664. Chisholm, M. J., and Hopkins, C. Y.
An oxygenated fatty acid from the seed oil of *Hibiscus esculentus*.
Canad. J. Chem., 1957, **35**: 358-64, bibl. 11.

The fatty acids of okra seed oil (*Hibiscus esculentus* L.) were examined. Acetylation of the oil, followed by saponification and separation of the acids, gave 12,13-dihydroxyoleic acid. From this and other evidence it is concluded that 12,13-epoxyoleic acid is present as a constituent of the glycerides. An oxygenated acid has not been identified previously in seed oils of this plant family (Malvaceae). 9-Hexadecenoic acid was also found. The total fatty acid composition was determined by distillation of the methyl esters and analysis of the distilled fractions. The percentages of the acids identified were estimated as follows: 9-hexadecenoic 0·6, palmitic 29, linoleic 39, oleic 23, stearic 2, 12,13-epoxyoleic 3, arachidic <1. Myristic, eicosenoic, and trienoic acids were not detected and, if present, are judged to have been in amounts less than 1% of the total. [Authors' abstract.]—Nat. Res. Counc., Ottawa.

2665. Horowitz, B., and Winter, G.
A new safflower oil with a low iodine value.
Nature, 1957, **179**: 582-3, bibl. 5.

The iodine value of the drying oil produced from safflower (*Carthamus tinctorius*) normally ranges from about 145 to 148. When testing samples of seed originally imported from India the authors found two individual plants yielding oil with values of 105 and 100 respectively. Inbreeding the latter variant for several generations resulted in plants producing a new type of edible oil with an iodine number of about 90–100. —C.S.I.R.O. and Defence Standard Labs, Melbourne.

2666. Gattani, M. L.
Studies on the control of damping-off of safflower with antibiotics.
Plant Dis. Reptr, 1957, **41**: 160-4, bibl. 3.

Out of 5 antibiotics tested for inhibition of 5 root-rotting fungi *in vitro*, actidione, patulin and filipin gave promising results. As actidione and patulin proved to be phytotoxic to safflower seeds and seedlings, filipin was used for studies on the control of the damping-off phase of the root rot of safflower caused by an unidentified species of *Pythium* in Alberta. Seed treatment of safflower with different concentrations of filipin for varying periods did not control the disease. Seven-day-old seedlings of safflower treated with 50 p.p.m. filipin for 72 hours and transplanted in soil infested with *Pythium* sp. showed 63·3 and 43·3% survival after 4 and 6 weeks, respectively, as compared with 5 and 2·5% in the control. When seeds of safflower were sown in soil infested with *Pythium* sp., which was subsequently treated with filipin, the surviving stand in the pots was 60·2 and 43·8% after 3 and 6 weeks as compared with 5·1 and 3·0% in the controls where the soil was not treated with filipin. [Author's abstract.]—Sci. Serv. Lab., Canada Dep. Agric., Lethbridge, Alta.

Sundry plants.

(*See also* 2671k, p, r, v, z.)

2667. Bond, G., and Gardner, I. C.
Nitrogen fixation in non-legume root nodule plants.
Nature, 1957, **179**: 680-1, bibl. 8.

As a result of improvements in cultural technique high rates of atmospheric nitrogen fixation have been obtained in experiments with alder (*Alnus glutinosa*), bog myrtle (*Myrica gale*) and sea buckthorn (*Hippophaë rhamnoides*). The ecological significance of N fixation by non-leguminous plants in regions of natural vegetation is briefly discussed. In any future development of the idea of preparing edible protein from leaves, these plants deserve consideration.—Dep. Bot., Univ. Glasgow.

2668. McClure, F. A.
Bamboo in the economy of oriental peoples.
Econ. Bot., 1956, **10**: 335-61, bibl. 30, illus.

Bamboos are used in the East as ornamentals and to provide raw materials for making paper, textiles, baskets, mats and ropes and for constructing houses, furniture and bridges, and they are also exported to the West for a variety of purposes. In describing these many uses the author mentions the principal species employed. The culture of bamboo as a farm crop in the East and the uses of bamboo culm sheaths are also discussed briefly.

2669. Lal, B. M., and Ranganatha Rao, K.
The food value of some Indian lichens.
J. sci. industr. Res. India, 1956, **15C**: 71-3, bibl. 20.

Examination of some Indian lichens of the *Usnea*, *Parmelia*, *Ramalina*, *Peltigera* and *Roccella* species shows that they may serve as valuable dietary supplements in view of their high calcium, iron and riboflavin content.—Vallabhbhai Patel Chest Inst., Delhi Univ., New Delhi.

2670. Timell, T. E.
Vegetable ivory as a source of mannan polysaccharide.
Canad. J. Chem., 1957, **35**: 333-8, bibl. 16.

Native vegetable ivory [the endosperm of the seed of the tagua palm (*Phytelephas macrocarpa*)], has been found to contain in addition to the mannose also glucose residues together with minor amounts of galactose, arabinose, xylose, and rhamnose units. No pectin could be detected. The native material was very non-uniform and was composed of two major portions (mannans A and B) which differed considerably in their average molecular weight and polymolecularity. Alkaline extraction of the untreated product followed by purification via the copper complex offers the best means for obtaining a pure mannan polysaccharide. [Author's abstract.]—Dep. Chem., McGill Univ.

Noted.

2671.

a Analytical Methods Committee.
The determination of linalol in essential oils.
Analyst, 1957, **82**: 325-9, bibl. 4.

b Balakrishnan, V. K.
Spectroscopic investigation of essential oils. Part I. Quantitative evaluation of sandalwood oil through infra-red spectroscopy.
Perfum. Essent. Oil Rec., 1956, **47**: 383-90, bibl., from abstr. in *Trop. Abstr.*, 1956, **11**: No. d3390.

c Bernardo, F. A., and Umali, D. L.
Possible sources of resistance to abacá mosaic and bunchy-top.
Philipp. Agric., 1956, **40**: 277-84, bibl. 5.
In *Musa* species, varieties and hybrids.

d Berton, A.
Analyse des matières grasses par absorption infra-rouge. (**Analysis of fats and oils by infra-red absorption.**)
Oléagineux, 1957, **12**: 281-9, bibl. 18.

e Bhattacharji, S., Dhar, M. M., and Dhar, M. L.
Raunescine—a subsidiary alkaloid from *Rauvolfia canescens* Linn.
J. sci. industr. Res. India, 1956, **15B**: 506-9.

f Borisova, N. A.
On the introduction of *Gentiana lutea* into cultivation. [Russian.]
Bot. Žurnal, 1957, **42**: 464-72, bibl. 23, illus.
Composition, uses, distribution in Europe and possibilities in the U.S.S.R.

g Bradley, C. E.
Yerba de la fleche—arrow and fish poison of the American Southwest.
Econ. Bot., 1956, **10**: 362-6, bibl. 10.
Analysis and toxicity tests on latex of *Sapium biloculare*.

h Braeckman, P.
Bijdrage tot de farmacognostische kennis van *Rauwolfia vomitoria* Afz. (Apocynaceae). (**Contribution to the pharmacognostic knowledge of *Rauwolfia vomitoria*.**)
Pharm. T. België, 1956, 33(5): 105-10, illus., from abstr. in *Trop. Abstr.*, 1956, **11**, No. d3397.
Macro- and microscopic characteristics of the root.

i Burg, J. P. L. L. A.
De teelt van geneeskrachtige en aromatische gewassen. (**Growing medicinal and aromatic herbs.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 123-6, illus.
In the Netherlands since the war.

j Celino, M. S., and Martinez, A. L.
Transmission of viruses from different plants to abacá (*Musa textilis* Nee).
Philipp. Agric., 1956, **40**: 285-302, bibl. 10.

k Dhar, D. C., Shrivastava, D. L., and Sreenivasaya, M.
Studies on *Emblica officinalis* Gaertn: Part 1.—Chromatographic study of some constituents of amla.
J. sci. industr. Res. India, 1956, **15C**: 205-6, bibl. 2.
12 separate tannins and 3 or 4 colloidal complexes.

l Dumont, D.
La culture du ricin aux États-Unis. (**Castor bean growing in the United States.**)
Oléagineux, 1957, **12**: 273-8, illus.

m Esdorn, I., and Schmitz, H.
Pharmazeutisch bedeutsame *Rauwolfia*-Arten. (**Rauwolfia species of pharmaceutical importance.**)
Reprint from *Pharmazie*, 1956, **11**(1): 50-63, bibl., illus., from abstr. in *Trop. Abstr.*, 1956, **11**, No. d3398.
Descriptions, etc., of *R. serpentina*, *R. canescens* and *R. vomitaria*.

n Guenther, E., Kulka, K., and Rogers, J. A.
Essential oils and related products.
Analyt. Chem., 1957, **29**: 630-7, bibl. 200.
Biennial review of analytical procedures.

o Gupta, B., and Bal, S. N.
Pharmacognostic studies of *Tylophora indica* (Burm. f.) Merr.
J. sci. industr. Res. India, 1956, **15C**: 111-14, bibl. 7, illus.
Macroscopical and microscopical.

p Harkevič, S. S.
***Colchicum autumnale* and the feasibility of its introduction.** [Russian.]
Bot. Žurnal, 1957, **42**: 98-102, bibl. 18, illus.
In the U.S.S.R. and details of culture for colchicine, etc.

q Hein, E. A.
El cultivo de la higuerilla. (**Cultivation of castor beans.**)
Inf. SCIPA, 1956, No. 28, pp. 32-8, illus.
4 varieties from the U.S.A. have given good results in Peru.

r Koroleva, V. A.
The intraspecific diversity of *Taraxacum kok-saghyz* and its significance for the transformation of this species into a cultivated plant. [Russian.]
Bot. Žurnal, 1957, **42**: 414-25, bibl. 18, illus.
Biotypes occurring and their suitability for cultivation.

s Krajkeman, A. J.
Castor oil, a raw material for perfumery chemicals.
Perfum. Essent. Oil Rec., 1957, **48**(1): 23-9, from *Trop. Abstr.*, 1957, **12**, No. e753.
Including composition of seeds and oil.

t McKern, H. H. G., and Willis, J. L.
Some new Australian essential oils.
Perfum. Essent. Oil Rec., 1957, **48**(1): 16-17, from *Trop. Abstr.*, 1957, **12**, No. e748.
Melaleuca ericifolia, *M. viridiflora* and *Leptospermum liversidgei* and their oils.

u Ojha, V. N., Sharma, P. G., and Aggarwal, J. S.
Pale coloured fatty oil from kamala seeds.
J. sci. industr. Res. India, 1956, **15B**: 551-2, bibl. 4.
Extraction process for seed oil of *Mallotus philippinensis* described.

v Pérez-Arbeláez, E.
Plantas utiles de Colombia: bambuseas. **(Useful plants of Colombia: bamboos.)** [English summary 5 lines.]
Maveg., 1957, **2**: 102-11, bibl. 26.
Uses, biology and culture of bamboos.

w (Prost, A.)
A la station expérimentale de Niangoloko (Haute-Volta). **(At the Niangoloko experimental station, Upper Volta.)**
Afrique nouv., 19 Feb., 1957, reprinted in part in *Oléagineux*, 1957, **12**: 291-3, illus.
Including notes on cultivation and selection of *Butyrospermum parkii.*

x Ramprasad, C., and Sirsi, M.
Studies on Indian medicinal plants: *Curcuma longa* Linn. *In vitro* antibacterial activity of curcumin and the essential oil.
J. sci. industr. Res. India, 1956, **15C**: 239-41, bibl. 19.
The sodium salt of curcumin has antibacterial properties.

y Rankoff, G., and Georgiew, G.
Untersuchungen über die Zusammensetzung und Trocknungsfähigkeit des bulgarischen Mohnöls. **(Studies on the composition and drying capacity of Bulgarian poppy oil.)**
C.R. Acad. bulg. sci., 1956, **9**(1): 55-8, bibl. 5.
Seeds of *Papaver somniferum* contain about 50% oil.

z Regel, C.
Farbstoffpflanzen im Mittleren Osten. I. Farbstoffpflanzen aus Transkaukasien. **(Dye plants of the Middle East. I. Dye plants from Transcaucasia.)** [French summary 5 lines.]
Maveg., 1957, **2**: 112-22, bibl. 8.

2672.

a Šafeev, N. G.
A case of intracapsular proliferation in *Papaver somniferum*. [Russian.]
Bot. Žurnal, 1957, **42**: 456-7, bibl. 7, illus.
A note on flowers found in the seed capsule.

b Satyanarayana, M. N., and others.
Poppy seed proteins.
J. sci. industr. Res. India, 1956, **15C**: 211-12, bibl. 10.
Seed contains 22%, defatted meal 38%.

c Singh, P.
Pharmacognostic study of root of *Ricinus communis* Linn.
J. sci. industr. Res. India, 1956, **15C**: 259-62, bibl. 6, illus.
Macroscopic and microscopic characters.

d Spickett, R. G. W.
A method for the separation of the constituents of pyrethrum extract.
Chem. Ind. Lond., 1957, No. 18, p. 561, bibl. 10.
Developed at Colon. Prod. Lab., London.

e Spoon, W.
Enkele opmerkingen over de toekomst van de kapok. **(Some remarks on the future of kapok.)** [English summary ½ p.]
Ber. Afd. trop. Prod. kon. Inst. Tropen **256**, 1956, pp. 7, bibl. 6, illus.
Competition with synthetic substances discussed.

f Subbaratnam, A. V., and Siddiqui, S.
Chemical examination of the seeds of *Alangium lamarckii* Thwaites: Part I.—Alkaloidal constituents of the seed kernels.
J. sci. industr. Res., India, 1956, **15B**: 432-7, bibl. 12.
Kernels yielded 0·8% total amorphous alkaloids.

g Subbaratnam, A. V., and Siddiqui, S.
Studies on the irritant factor of pyrethrum flowers.
J. sci. industr. Res. India, 1956, **15B**: 243-5, bibl. 20.
Chrycinnerol.

h Tallarico, G.
Il lentisco. **(The mastic tree.)**
Ital. agric., 1952, **89**: 293-8, illus. [received 1957].
The tree and its many products described.

i Umali, D. L., and Brewbaker, J. L.
Abacá and its improvement.
Philipp. Agric., 1956, **40**: 213-30, bibl. 36.
Progress in breeding for mosaic resistance reviewed.

j Umali, D. L., Ick, F. R., and Orillo, F. T.
Reaction of varieties of abacá and its relatives to vascular disease.
Philipp. Agric., 1956, **40**: 115-19, bibl. 6.
Only Canton was resistant to *Fusarium oxysporum* var. *cubense.*

k VALMAYOR, R. V., MENDOZA, E. M., AND MILLARE, V. E.
A cytological study of abacá and its relatives.
Philipp. Agric., 1956, **40**: 269-76, bibl. 10, illus.
Varieties and hybrids of *Musa textilis* and *M. balbisiana.*

l VIDAL, P.
Micro-méthode rapide de dosage de la quinine dans les écorces de quinquina. **(A rapid method of micro-determination of quinine in cinchona.)** [English and Spanish summaries 7 and 8 lines.]
Agron. trop., 1957, **12**: 114-18, bibl. 5.
By fluorescence.

FLORICULTURE.

General.

(*See also* 2087i, 2182d, 2275, 2337, 3012, 3019.)

2673. CARRA, P., NAVARRE, P., AND COSTE, —.
Floriculture algérienne. **(Floriculture in Algeria.)**
Rev. hort. Algér., 1956, **60**(11-12): 1-107, illus.

The present status of commercial flower growing in Algeria is outlined. Crops recommended include asparagus fern, gerbera, mimosa, carnation, sweet pea, rose, *Strelitzia*, arum, and gladiolus. Cultural packing, marketing, manuring, and pests and diseases are among the subjects dealt with.

2674. SAAKOV, S. G.
The concept of variety in flowering ornamentals. [Russian.]
Bot. Žurnal, 1955, **40**: 561-5.

After discussing other definitions, the author defines a variety, as applied to ornamentals, as an association of individual cultivated plants obtained from selected mother plants under such physico-geographical conditions as will ensure high ornamental value. It is characterized under specific conditions of cultivation by stable inheritance when propagated sexually or vegetatively. The importance of transcribing varietal names correctly, especially those from foreign languages, is stressed.

2675. RIEHL, G.
Der Einfluss der Blattfläche auf die Stecklingsbewurzelung. **(The effect of leaf area on rooting of cuttings.)**
Dtsch. Gartenb., 1957, **4**: 65-7, bibl. 8, illus.

Reduction of the leaf area of carnation cuttings caused poor rooting at all levels of humidity in the media. Coleus cuttings from which the lowest leaf pair and part of the stem had been removed showed much less root growth than cuttings which retained all their leaves. Among other ornamental plants which showed the same tendency were chrysanthemums, hydrangeas, pelargoniums and salvias.—Inst. Zierpfl-Bau, Berlin-Köpenick.

2676. HILLER, W.
Die Assimilation von Zierpflanzen bei unterschiedlichen Lichtverhältnissen und unterschiedlicher Gestaltung anderer Wachstumsfaktoren. **(The photosynthetic activity of ornamental plants under varying conditions of light and growth.)**
Arch. Gartenb., 1956, **4**: 178-210, bibl. 27.

The following are the chief results obtained in experiments with begonia, fuchsia and cyclamen: (1) Photosynthetic activity began immediately on turning on the light. No significant increase in net assimilation rate was observed during the early stages of illumination. (2) Short rhythms (0·1 min.) of illumination were utilized by the plants as efficiently as other rhythms. (3) The highest net assimilation rate, in relation to wattage, was obtained in response to fluorescent light, light with an orange to red emission spectrum giving the best results; however, plants grown entirely in artificial illumination also need blue light for the sake of its formative and flower-inducing effects. (4) Up to 420 watt/sq. m. the net assimilation rate increased linearly with light intensity. (5) The net assimilation rate decreased with rising temperature, the optimum for 420 watt/sq. m. of red fluorescent light being in the region of 12° C. (6) At low temperatures (8–16° C.) the plants were capable of depressing the CO content of the air further than at higher temperatures (27–35° C.). (7) A depression of the net assimilation rate under a clear sky at noon was avoided by reducing the temperature. (8) No depression of the net assimilation rate occurred under glasshouse conditions of high atmospheric humidity and low wind velocity (under 2 m./sec.).—Inst. Zierpflanzenb. Humboldt-Univ. Berlin.

2677. GARCÍA GANCEDO, A. P.
Algunas experiencias realizadas con fitohormonas sobre diversas especies vegetales. **(Some experiments carried out with growth substances on different plant species.)**
An. Jard. bot. Madrid, 1954, 1955, **13**: 79-94, illus.

The most successful treatment for inducing fruiting in normally sterile plants was spraying the flowers with 1/1,000 aqueous 2,4-D. This induced fruit formation in *Iris germanica*, *I. florentina*, *Convallaria majalis*, *Milla uniflora*, *Agave* sp. and in hand pollinated flowers of *Tulipa gesneriana.* In most instances a minority of the fruits contained seeds and many of these were without embryos, but some from *Agave* produced normal plants. The treatment retarded the fall of mature flowers, but caused a rapid abscission of buds. It was ineffective with pollinated flowers of *Phyllocactus phyllanthoides*, which, however, responded to spraying with 1/100,000 α-naphthaleneacetamide by increased flower persistence and a single flower previously pollinated from *Cereus flagelliformis* produced a fruit. In no other species tested did this substance induce fruiting except when used at 1/500,000 concentration on *Convallaria majalis.* No results were obtained by spraying this species and *I. germanica* with β-naphthoxyacetic acid.

2678. Raabe, R. D.
Physiological breakdown of chlorophyll in the Gesneriaceae.
From abstr. in *Phytopathology*, 1957, **47**: 28.

Tests were carried out to determine which environmental factors were responsible for loss of green colour and ring spotting in leaves of members of the Gesneriaceae, including *Gloxinia* and *Saintpaulia*. Factors found to affect the breakdown of chlorophyll were light intensity, wave lengths of light used, temperature differences between the leaf and the water used, and length of exposure to cold water. The more highly pigmented varieties within a species were more resistant to injury than the less pigmented ones.

2679. (Shread, J. C.)
Control aphids in mum plants with systemic insecticides.
Flor. Exch., 1957, **128**(8): 45.

Thimet and compound G-22870 used as soil drenches gave complete control of *Aphis helichrys* and *Macrosiphum sanborn* on chrysanthemums. Compound 12008 and Thimet gave excellent aphid control on geraniums when applied as soil treatments. Thimet was more effective than Systox in controlling cyclamen mite on cyclamen. Endrin and Loro used as dips gave reasonably good control of cyclamen mite in the leaves of cyclamen plants, but poor control in the flower buds.—Conn. agric. Exp. Stat., New Haven.

2680. Fitzwater, W. D.
Control of animal pests.
Amer. Nurserym., 1956, **104**(9): 10, 92-4, illus., and **104**(11): 14, 64-5.

Descriptions are given of the types of damage commonly caused by animal pests on ornamental and fruit nursery stock and lawns. Control measures are recommended against the following pests: birds, crayfish, deer, dogs, field mice, house rats and mice, moles, pocket gophers, rabbits, skunks, squirrels and woodchucks.

2681. Kerr, S. H.
Pesticides and plant injury.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 398-403.

Various pesticides were applied at 2 concentrations to a group of ornamentals. *Ficus carica* was very sensitive to all the compounds applied. *Pilea cadierei* was damaged by low concentrations of parathion, malathion and Aramite. Boston and maidenhair ferns were injured by malathion, and *Cocculus laurifolius* and some rose varieties were also sensitive to this material. *Feijoa sellowiana* and *Philodendron friedrichstahli* were injured by Aramite and malathion. Aramite also injured the leaves of pothos and the petioles of unopened or just-opening fronds of *Neanthe bella* palms. Soil drench treatments appeared to be harmless except that Nemagon inhibited growth of caladiums. Precautions which help to minimize phytotoxicity are discussed.—Fla agric. Exp. Stat., Gainesville.

2682. Martinez, A. P.
Fungicides and plant injury.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 413-15, illus.

Maneb applications to *Gardenia jasminioides* resulted in severe leaf burn and defoliation. Maneb, zineb and nabam with zinc sulphate were phytotoxic to *Pilea cadierei*. No injury was observed on *Philodendron panduraeforme, Scindapsus aureus, Dieffenbachia amoena* and *Syngonium* sp.—St. Plant Bd Fla, Gainesville.

2683. Klaus, H.
Zineb zur Saatgutbeizung und Stecklingsvermehrung. **(Zineb for seed disinfection and cuttings.)**
Gartenwelt, 1957, **57**: 110-11, bibl. 5.

Seed of 27 ornamental species was treated effectively with 2–4% zineb powder without damaging the seed. Three methods of treating cuttings, of begonias, chrysanthemums, pelargoniums, and salvias were tested, and the most effective material was zineb dust. Liquid application appeared to encourage fungus attack.—Versuchsstat. Schwabenheim.

2684. Baresi, F.
Lo zineb nelle culture floreali a Sanremo. **(Zineb in floriculture at San Remo.)**
Not. Mal. Piante, 1957, No. 40/41, p. 145.

Zineb has proved more satisfactory than copper fungicides for controlling rust and *Alternaria dianthi* in carnations and rust and mildew (*Phragmidium subcorticium* and *Peronospora sparsa*) in roses.

2685. Manzelli, M. A., and Young, V. H., Jr.
Tolerance of plants to V-C 13 Nemacide.
Plant Dis. Reptr, 1957, **41**: 195-200.

Plants found tolerant to V-C 13 Nemacide (an emulsifiable concentrate containing 75% O-2,4-dichlorophenyl O,O-diethyl phosphorothioate) are listed. They comprise 60 ornamental species (including annuals, bulbs and shrubs), 11 trees and berries (including apple, peach, blueberry and citrus), 11 lawn grasses and 12 field and truck crops. In most cases information is given on the age or growth stage of the plant, amount of V-C 13 applied and the method of application.—Virginia-Carolina Chem. Corp., Richmond, Va.

2686. Young, V. H., Jr., Somerville, A. M., Jr., and Carnes, J. L.
Nematode control in potted ornamentals with V-C 13 Nemacide.
Plant Dis. Reptr, 1957, **41**: 271-7, illus.

V-C 13 Nemacide [containing *O*-2,4-dichlorophenyl *O,O*-diethyl phosphorothioate] controlled root-knot, spiral, and meadow nematodes when applied at the rate of 5 ml. per cu. ft. of soil to potted boxwood, Japanese holly and privet plants held in the greenhouse. Plant response was obtained with soil-drench and soil-mix applications, but counts showed better nematode control with the soil-mix treatment. There was no evidence of phytotoxicity, even though in some instances V-C 13 was applied at three times the 5 ml. rate. [Authors' abstract.]—Res. and Dev. Dep., Virginia-Carolina chem. Corp., Richmond, Va.

Annual and herbaceous plants.

(*See also* 2025, 2028, 2034, 2063, 2129, 2328, 2332, 2497, 2556b, 2634, 2675, 2679, 2684, 2762b, l, o, p, r, 2763e, g, j, q.)

2687. Puccini, G.
Azione dei sali di litio sulla produttività del garofano rifioriente della Riviera. **(Effect of lithium salts on productivity of perpetual flowering carnations of the Riviera.)** [English summary ½ p.]
Ann. Sper. agrar., 1957, **11**: 41-63, bibl. 16.

Both the nitrate and the chloride of lithium, applied as 0·1% solutions to carnation soil, monthly from July to October inclusive and in March, at 500 c.c. per plant, gave stronger plants, longer flower stalks, higher production (especially in winter) and many more first-quality flowers than in controls. Lithium sulphate at the same rate was equally beneficial to vegetative development and produced a higher total increase of flowers, but a smaller proportion of these was of first quality than from plants receiving nitrate or chloride. Lithium carbonate at 1·37% was highly toxic. At 0·685% it reduced vegetative growth and substantially increased the number, but reduced the quality of flowers, inducing short stalks, small size and fewer petals. [Numerical data in one table appear to contradict this statement, the numbers of first-quality flowers quoted totalling 3985 from carbonate as against 3402, 3856 and 3831 from sulphate, nitrate and chloride respectively.] All the lithium salts used reduced the percentage of flowers with split calyx. Of the 5 varieties involved, Villafranca was least and Vanna most responsive to lithium. In no case were treated plants less susceptible than untreated ones to rust (*Uromyces caryophyllinus*).—Staz. sper. Floric. Sanremo.

2688. QUAK, F.
Meristeemcultuur, gecombineerd met warmtebehandeling, voor het verkrijgen van virusvrije anjerplanten. **(Meristem culture combined with heat treatment as a method for obtaining virus-free carnation plants.)** [English summary 9 lines.]
Tijdschr. PlZiekt., 1957, **63**: 13-14, bibl. 4.

Small portions of the stem tips were removed from carnation plants (varieties Pink Sim and Harvest Moon), which had been kept at 40° C. for 6 to 8 weeks. These tips consisting of meristem and leaf primordia were cultured in a nutrient agar under sterile conditions. The plants which developed will be used as virus-free mother plants.—Inst. PlZiektenk. Onderz., Wageningen.

2689. BAKER, R.
Comparative studies on the resistance of two carnation varieties to *Fusarium* stem rot.
From abstr. in *Phytopathology*, 1957, **47**: 3.

When Miller's Yellow and William Sim carnations were inoculated with *Fusarium roseum* f. *cerealis* immediately after striking or transplanting, no consistent differences in susceptibility were noted. In further tests rooted cuttings of the 2 varieties were inoculated at intervals 0–24 days after transplanting. Miller's Yellow was still susceptible 24 days after transplanting, whereas William Sim was moderately resistant after 4 days.

2690. PRITCHARD, A. E.
New carnation pests.
Calif. Agric., 1957, **11**(3): 5, illus.

The carnation bud mite, *Aceria paradianthi*, was first recorded in California in 1952 and is now fairly widespread. Parathion, chlorobenzilate and Kelthane have proved effective only against mites which happen to be exposed. Recently more promising results have been obtained with diazinon at 3 lb. of a 25% w.p./100 gal. and with an experimental compound Phostex at 1 pt. 25% emulsion/100 gal. Another new pest is a leaf miner, *Liriomyza* n.sp., which has been effectively controlled by 2% parathion dust applied at intervals of 10 to 14 days.

2691. ANON.
Finalmente un rimedio sicuro contro la bega dei garofani. **(A reliable means of controlling the tortrix moth of carnations.)**
Not. Mal. Piante, 1957, **39**: 99-100.

Didifos 50, a mixture containing 40% of DDT and 10% of parathion, gave excellent control of *Tortrix* (*Cacoecia*) *pronubana* in carnations and also showed promise in tests against fruit fly, olive fly, fruit moth (*Cydia molesta*) and leaf miners.

2692. WOLTZ, S. S.
Studies on the nutritional requirements of chrysanthemums.
Proc. Fla St. hort. Soc., *1956*, 1957, **69**: 352-6, bibl. 5.

Observations on the nutritional responses of 2 chrysanthemum varieties are described. For future sand culture experiments it is suggested that optimum levels in the nutrient solution would approximate to (in p.p.m.): N 100–100, P 40, K 100–200, Mg 25–50, B 0·1, Cu 0·1, Fe 1·0, Mn 0·25, Zn 0·5.—Gulf Coast Exp. Stat., Bradenton, Fla.

2693. BRYDEN, J. W., and HODSON, W. E. H.
Control of chrysanthemum eelworm by parathion.
Plant Path., 1957, **6**: 20-4.

Parathion has given economic, but not complete, control of chrysanthemum eelworm (*Aphelenchoides ritzema-bosi*). Satisfactory control was obtained with early-flowering outdoor varieties by 2 post-rooting treatments. Three applications were necessary to control eelworm in mid-season and late flowering varieties, namely 1 before and 2 after rooting. Parathion concentrations of 0·005% and 0·025% gave similar control. There was an indication that later striking of cuttings of indoor varieties may help in reducing eelworm build-up and increase the efficiency of control by parathion.—N.A.A.S., Reading.

2694. CHHONKAR, V. S., KHANNA, A. N., AND SINHA, R. B.
Colchicine treated cosmos.
Indian J. Hort., 1957, **14**: 64.

Flowers of colchicine-treated plants had more and broader petals, with a fringed margin, and the involucre was larger than in untreated plants.—Gov. agric. Coll., Kanpur, U.P.

2695. MCWHORTER, F. P.
Virus diseases of geranium in the Pacific northwest.
Plant Dis. Reptr, 1957, **41**: 83-8, bibl. 15, illus.

Four virus diseases of geranium are described. Observations have indicated that taking tissue-cultures from the meristematic tip areas of selected, apparently healthy plants is a practical method of obtaining virus-free plants of established commercial varieties.—Ore. St. Coll., Corvallis.

2696. Kivilaan, A.
Ringspot and other disorders of pelargonium that are caused by graft-transmissible agents.
From abstr. in *Phytopathology*, 1957, **47**: 20-1.

Necrosis, necrotic ringspot, ringspot, crinkle and mottle symptoms, apparently of virus origin, developed in seedling plants of *Pelargonium hortorum* grafted with scions from standard varieties. There was no evidence to indicate that a single virus was involved. Generally the parent plants appeared to be normal, but plants of some varieties, known to be infected, sometimes had small leaves, mottle of lower leaves or short internodes. Cuttings taken from lower portions of infected plants often developed necrosis, ringspot, crinkle or mottle when growth resumed. Attempts to transmit the virus or viruses mechanically or by dodder were unsuccessful. A procedure was developed to determine the presence of virus in propagating material, namely veneer grafting scions to stocks of highly sensitive clones. Plants of 6 varieties tested showed an average of 62% infection. Virus-infected plants were more susceptible to bacterial blight than were virus-free plants.

2697. Hollings, M.
Pelargonium ring spot.
Plant Path., 1957, **6**: 17-18, illus.

Leaf and flower symptoms observed on *Pelargonium peltatum* are described. The type of symptom and its ability to be transmitted by grafting suggest that the condition is caused by a virus.—Plant Path. Lab., Harpenden.

2698. Bragina, K. K.
The effect of chemical compounds on the colour of the corolla in hybrid gloxinia.
[Russian.]
Bjul. Gl. bot. sada, 1955, No. 23, pp. 101-2.
From abstr. in *Ref. Ž.* (*Biol.*), 1956, No. 22, abstr. 95184.

When young gloxinia plants, at the botanic garden of Moscow University, were sprayed with solutions of various salts the greatest deviation in flower colour was produced by 0·5% KI. A 10% solution of Zn also affected colour, while treatment with KH_2PO_4 affected one variety but not another. Spraying annual asters with B and zinnias with Pr and Zn was ineffective.

2699. Papazova, G.
The inheritance of doubleness in petunia.
(Bulgarian, with Russian summary 1½ p.]
Nauč. Trud. Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1956, 3: 251-66, bibl. 13.

A study was conducted on the effect of historical age, mineral nutrition and individual age of the mother plants on the inheritance of doubleness in the F_1 generation of *Petunia nyctageniflora*, *P. hybrida* and *P. hybrida* × its double form. The percentage of double flowered plants in the progeny was affected to some extent by all 3 factors, but it is considered that doubleness in petunia is a more complex manifestation and that its inheritance depends on conditions other than those studied.

2700. Pringle, C. O.
Rooting cuttings in polythene bags.
Gdnrs' Chron., 1957, **141**: 275, illus.

Saintpaulia leaf cuttings planted in John Innes seed compost in sealed polythene bags will root in 3–4 weeks, and produce plantlets in 6–8 weeks, which are ready for separation from the leaf a month later. No attention is needed during this time. Leaf cuttings have been rooted in polythene bags containing only a few drops of water or in sand or vermiculite, but the plantlets developed better if the leaf cuttings were transferred to soil when the roots had formed. J.R.L.

2701. McDonough, E. S., and McGray, R. J.
***Botrytis* on saintpaulia amd its relation to mite control.**
Phytopathology, 1957, **47**: 109-10, bibl. 3, illus.

In several trials spraying with Dimite (25% di-(*p*-chlorophenyl) methylcarbinol) at 1 and 2 ml./gal. freed saintpaulia plants from mites (*Tarsonemus pallidus*) and also from *Botrytis cinerea* except on a few dead leaves. Control plants were heavily infested by both mites and fungus. It would seem that mite injury may be one of the factors predisposing saintpaulia plants to attack by *Botrytis*.—Marquette Univ., Milwaukee, Wis.

Bulbs, tubers, etc.

(*See also* 2328, 2333, 2676, 2678, 2679, 2762f, g, j, s, x, z, 2763a, b, d, l, 2765.)

2702. Horton, D. E.
Bulbs.
Rep. Rosewarne exp. Hort. Stat. 1952–55, 1956, pp. 25-43, bibl. 4.
Report from Rosewarne—2. Hot water treatment for bulbs.
Comm. Gr, 1957, No. 3187, pp. 225-7, illus.

Variety trials: Species include narcissus, tulip, hyacinth, iris, gladiolus, *Ixia* and *Sparaxis*. *Mechanised planting:* Ploughing-in was most successful of several methods tested. *Hot water treatment:* No adverse effect resulted from the treatment of tulips at an early post-flower stage; perfect growth and flowers were produced when narcissi and irises were treated in mid-season (mid-July to mid-August); *Muscari* responded well to hot-water treatment; the addition of a spreader to hot water increased its effectiveness. *Narcissus planting:* Shallow-planted bulbs (3 in.) showed a virus-like twisting of the foliage; early planting resulted in better growth and flowering, and the effect continued for more than one season. *Freesias:* a peat mulch induced earlier emergence and flowering but the flowers were abnormally dwarfed for some time. *Chemical weed control:* TCA applications caused delayed growth and flower damage in bulbs; PCP and white spirit have given the best control so far without damage to the bulbs. *Soil fumigation:* DD gave effective nematode control without affecting narcissus growth, but damage from ethylene dibromide was apparent at an early stage. *Narcissus fly:* In one year's experiments BHC gave better control than DDT; grassing down with Timothy after planting gave good control, but at the expense of bulb growth. *Diseased foliage destruction* was effected in the field with white oil or sodium arsenite. *Tulip fire:* Dithane Z.78 was outstanding for both bulb yield and fire control.

2703. Jeff, A. E.
Anemones.
Rep. Rosewarne exp. Hort. Stat. 1952–55, 1956, pp. 11-18.
Report from Rosewarne—1. Observations on anemones.
Comm. Gr, 1957, No. 3186, p. 179.

Nutrition. In a combined planting and manurial trial it was shown that the earliest planting (May 20) produced the highest total yield of flowers; treatments which included dung produced the highest flower yields; N had a depressing effect on total yields; and a surprisingly low yield was also obtained from 2 plots receiving K only. *Pests.* Good control of springtails was obtained by lindane and aldrin. *Cultural operations.* There was an indication that infection with *Peronospora ficariae* was one of the chief causes of failure when anemones were grown continually in the same ground; in planting trials yields from raised beds carrying 4 rows 12 in. apart were generally lower than from single rows and for the latter a row-width of 20 in. was better than one of 15 in. *Shelter.* Better quality flowers were produced from plants sheltered by a solid straw bale wall or by lath fencing than from unsheltered plots; it was found essential to give both side and overhead protection to the plants during severe winter weather.

2704. Aragaki, M., Sherman, M., and Kamemoto, H.
Phytotoxicity of chemical sprays to anthurium.
Hawaii Fm Sci., 1957, **5**(3): 10-11, illus.

Several common insecticides, acaricides and fungicides were applied to Suehiro White anthuriums. Phytotoxicity was shown by emulsifiable aramite, by ziram, ferbam and thiram as wettable powders and by maneb as a colloidal suspension.

2705. de Mol van Oud Loosdrecht, W. E.
Colchicin—Versuche mit *Crocus aureus*. **(Colchicine—studies with *Crocus aureus*.)**
Gartenbauwiss., 1956, **3**: 308-19, bibl. 16, illus.

Drop application of colchicine affected both leaf and flower growth of *Crocus*, and the modifications induced are described.

2706. Mayer-Hörster, L.
Vegetative Vermehrung von *Cyclamen persicum*. **(Vegetative propagation of *Cyclamen persicum*.)**
Gartenwelt, 1957, **57**: 1-2, illus.

A method of vegetative propagation using 1-year-old cyclamen corms is described. Roots, shoots and the outer corky skin were removed from the corms which were then sterilized overnight in mercuric chloride. The corms were then cut into cubes and placed on a nutrient medium. Shoot and root growth or callusing occurred when NAA was included in the medium. Maximum root growth occurred with 5 mg. NAA/l., and shoot growth with 0·005 mg./l. After about 100 days the plantlets were transferred to a soil mixture.

2707. Seyffert, W.
Cyclamen—Blattzeichnung beim Jungpflanzenkauf aufschlussreich. **(Cyclamen leaf markings are informative when buying young plants.)**
Gartenwelt, 1957, **57**: 57-8, bibl. 1, illus.

Four types of leaf marking in cyclamen have been identified and their mode of inheritance studied. No relation between flower colour and leaf markings was apparent. In young plants leaf markings may be used as a basis for comparing the growth of seedlings from different sources.

2708. Scholten, G.
Wortelrot bij cyclamen. **(Cyclamen root rot.)**
Tijdschr. PlZiekt., 1957, **63**: 30-1.

Studies on root rot of cyclamen indicated that it resulted from infection by *Cylindrocarpon radicicola.* Losses were reduced by dipping the roots and soil ball in a solution of captan or TMTD.

2709. Goidànich, G.
Un nuovo fitofago del ciclamino. **(A new pest of cyclamen.)**
Inf. fitopat., 1956, **6**: 369, illus.

The mite *Phyllocoptes trotteri*, hitherto considered harmless, may severely damage cyclamen leaves. It has been controlled by repeated treatments with phosphoric-ester insecticides.

2710. Plantenziektenkundige Dienst, Wageningen.
Ziekten en plagen in 1955. Cyclamen. Aardbeimijt, *Tarsonemus pallidus*. **(Pests and diseases in 1955. Strawberry mite on cyclamen.)**
Jaarb. PlZiekt. Dienst, Wageningen, 1955, 1956, p. 47.

Methyl bromide fumigation of cyclamen plants gave excellent mite control for up to 5 weeks. Under commercial conditions 2 fumigations of a glasshouse with cyanamide were also effective against the mite, but with methyl bromide the use of a fumigation chamber gave better results than glasshouse fumigation.

2711. Bonnemaison, L.
Possibilités d'emploi des insecticides endothérapeutiques en vue de la protection des plantes contre les maladies à virus. **(Possibilities of using systemic insecticides for the protection of plants against virus diseases.)**
Ann. Épiphyt., 1956, **7**: 563-640, bibl. 123.

A series of tests is described in which insecticides were applied for aphid control. Parathion, schradan, isolan and demeton were phytotoxic to dahlia tubers dipped in them.

2712. Woltz, S. S.
Fertilization of gladiolus.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 347-51.

The nutrient requirements of gladiolus are discussed. In two 3-season fertilizer experiments the varieties Rosa Van Lima and June Bells showed greater responses to N than did Picardy and Valeria, a result which may be partly due to the high incidence of *Fusarium* in the latter two varieties. Small corms and cormels benefited from applications of up to 160 lb. N per acre. The general requirements of gladiolus for K were generally met by applying 160 to 240 lb. K_2O per acre during the growing season. When N was applied at 160 lb. per acre, flower production was increased by increasing K_2O from 160 to 320 lb. per acre.—Gulf Coast Exp. Stat., Bradenton, Fla.

2713. GUTTAY, J. R., AND KRONE, P. R.
The effect of rates of different fertilizers on the flowering and corm production of gladiolus over two seasons.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 424-31.

Three fertilizer grades, 4–16–4, 4–16–8 and 4–16–16, were applied to gladiolus at four rates, 100, 250, 500 and 1,000 lb. per acre, over two seasons in a greenhouse study. During both seasons, differences in fertilizer grade had little effect on plant growth. However, during the second season, the 4–16–16 grade produced the highest percent of plants to blossom as well as the slowest rate of opening of florets. All fertilizer treatments hastened plant maturity the first season. During the second season, maturity was affected only by the higher rates of fertilization in respect to delaying time of bloom. The higher fertilization rates produced significantly higher yields of corms the first season than did the lower rates. During the second season, there was little difference in yield of corms, but all fertilizer treatments increased weight of flower spike and number of florets per spike. [Authors' summary.]

2714. MAGIE, R. O.
Gladiolus *Botrytis* control.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 337-43, bibl. 9.

High levels of N and Ca fertilization have been shown to encourage infection. Among the fungicides tested as 5-second dips for gladiolus flower spikes in tight bud, Puratized Agricultural Spray, Vancide 51 and nabam plus zinc sulphate were effective. Griseofulvin, and the Mathieson compounds 1456 and 1563 were more effective than zineb in arresting the development of day-old lesions, and were also shown to have a systemic action. Excellent disease control in the field was obtained with maneb and zineb. Captan, Dowicide B and N.I. Ceresan were effective as corm treatments for *Botrytis* and also for *Fusarium.* Sanitation remains an important control measure.—Gulf Coast Exp. Stat., Bradenton, Fla.

2715. SGANZERLA, M.
Norme di prevenzione contro la *Botrytis* dei gladioli. **(Preventive measures against *Botrytis* in gladioli.)**
Not. Mal. Piante, 1957, No. 39, pp. 88-92, bibl. 1, illus.

The most successful measures against *B. gladiolorum* were early harvesting, prompt removal of residues of affected leaves and drying of harvested corms for 15 days at 20°–30° C. followed by storage at about 10° C. Coating with fungicides was effective only for mild infections, but checked the spread of the disease to healthy corms during storage. Neither thiram nor zineb had any curative value when applied in the field, but both showed slight preventive action at moderately high concentrations. Soil disinfection was ineffective.

2716. CIFERRI, R.
Disinfezione del suolo con Vapam e incidenza di *Fusarium* e di *Botrytis* sui gladioli. **(Soil disinfection with Vapam amd incidence of *Fusarium* and *Botrytis* on gladioli.)** [English summary 5 lines.]
Not. Mal. Piante, 1957, No. 40/41, pp. 141-4, bibl. 10.

In pot experiments very good results were given by soil fumigation with Vapam at 240–480 kg. per ha. and good control at 120 kg. The beneficial effects on corm multiplication were less marked than those on flower production.

2717. FORSBERG, J. L.
The fungicidal effects of some halogenated dinitrobenzenes on *Curvularia lunata* and *Fusarium oxysporum* f. *gladioli.*
From abstr. in *Phytopathology*, 1957, **47**: 12.

Curvularia was more resistant than *Fusarium* to all of the 14 fungicides tested. Against both fungi the fluorine-containing compounds were much more fungicidal than were the chloro, bromo or iodo compounds.

2718. CASARINI, B.
Le fusariosi del gladiolo. **(Fusarium infections of gladiolus.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 55-8, illus.

Storage rot, usually attributed to *Fusarium oxysporum* var. *gladioli*, can be controlled by pre-storage immersion of corms in 0·25% Ceresan, or by dusting, either with a 1 : 4 mixture of Tritisan (a chlorinated nitrobenzene product) and talc, or with Dithane. Yellowing of plants, supposedly due to *F. orthoceras* var. *gladioli*, can be controlled by soil fumigation with chloropicrin. There is evidence that both diseases are caused by the same pathogen.—Ist. Pat. veg. Univ. Studi-Bologna.

2719. KELSHEIMER, E. G.
The effect of parathion as a corm and soil treatment for gladiolus.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 403-5, bibl. 4.

Treatment of gladiolus corms with parathion improved growth and development, the best results being obtained by soil treatments with 5 and 10 lb. active ingredient. No data on flower production were obtained owing to the variable corm size.—Gulf Coast Exp. Stat., Bradenton, Fla.

2720. JUNGES, W.
Zusammenhänge zwischen Stadienentwicklung, Heimat und Kultur der Hyazinthe. **(Relations between phasic development, geographical origin and cultural methods in the hyacinth.)** [Russian and English summaries 12 lines each.]
Arch. Gartenb., 1956, **4**: 345-53, bibl. 15.

A close relationship is shown to exist between the temperature treatments used in Holland for forcing hyacinths and the climatic conditions prevailing in the plant's natural habitat in the Near East.—Inst. Gartenb. Dresden-Pillnitz.

2721. HARTSEMA, A. M., AND LUYTEN, I.
Early flowering of Dutch irises 'Imperator'. V. Light intensity and daylength. [Dutch summary 1 p.]
Acta bot. neerl., 1955, **4**: 370-5, bibl. 3 [received 1957].

Earlier work [see *H.A.*, 23: 3340] had shown that flowering percentage of Iris Imperator was proportional to the density of light received in a 16-hr. day. In further experiments the daylength was progressively reduced while the light intensity was held constant ($\pm 3{\cdot}3 \times 10^4$ erg/sec. sphere 1 cm.^{2} cross section). Reduction of daylength to 8 hr. did not decrease flowering percentage, but any further reduction resulted in a significant decrease. It was found that at daylengths shorter than 10 hr. flowering percentages were proportional to the total amount of light received. The relationship between bulb size and light requirement was also studied.—Lab. Plant physiol. Res., Wageningen.

2722. (Sganzerla, M.)
Lilium di recente creazione. **(New *Lilium* varieties.)**
Sementi elette, 1957, **3**: 69.

Lilium regale album pollinated with *Hippeastrum hybridum* produced *L. regale* plants in the F_1 generation. The varieties Addington and Hurricane produced seed only when pollination was supplemented by hormone treatment. New American hybrids are briefly described.

2723. Fowden, L., and Steward, F. C.
Nitrogen compounds and nitrogen metabolism in the Liliaceae. I. The occurrence of soluble nitrogenous compounds.
Ann. Bot. Lond., 1957, **21**: 53-67, bibl. 14.

Maps record the location on chromatograms of the identifiable substances from the 88 plant species examined and also of the large number of substances that have been observed but not yet identified. The occurrence of these compounds is considered in relation to the taxonomic classification. The natural occurrence of the more unusual soluble nitrogen compounds (γ-methyleneglutamine and other γ-substituted glutamic acids, azetidine-2-carboxylic acid) is taken to indicate the existence in plants of hitherto unrecognized metabolic pathways. [From authors' abstract.]—Cornell Univ., Ithaca, N.Y.

2724. Shimoya, C.
Anomalias meióticas en *Lilium candidum* L. atribuídas às mudanças de temperatura atmosférica. **(Meiotic anomalies in *Lilium candidum* attributed to changes in atmospheric temperature.)**
Rev. Ceres, 1956, **9**: 436-43, bibl. 11, illus.

Sudden falls of temperature reduced microsporogenous tissue to a pathological condition resembling that caused by certain toxins and excess salts.

2725. Zeijlemaker, F. C. J.
Growth of pollen tubes *in vitro* and their reaction on potential differences.
Acta bot. neerl., 1956, **5**: 179-86, bibl. 36, illus.

Studies with *Narcissus pseudonarcissus* var. Golden Harvest showed that *in vitro* growth of pollen tubes was accelerated by the addition of sugar to the medium but was unaffected by gravitation. Potential differences were found to exist in the flower. Pollen tubes grew *in vitro* in the direction of the cathode and were inhibited in the direction of the anode at a potential difference of about 0·5 volt per cm.

2726. Woodville, H. C.
Control of bulb fly damage in narcissus.
Plant Path., 1957, **6**: 10-12, bibl. 2 in text.

Previous results were confirmed in 1955–56 when Magnificence and King Alfred bulbs were completely protected from attack by bulb fly (*Merodon equestris*) by cold dips of aldrin or dieldrin. The growth of dipped bulbs was compared with that of untreated bulbs during 2 seasons. The protection given by treatments in the first year was complete, and damage in the second year was slight; growth and flower yields of the treated bulbs were much better than those of the controls. Chlordane at 0·5% and heptachlor at 0·12% were also used for the 15-minute dip; heptachlor gave complete protection and chlordane-treated plots were only slightly attacked. With Carlton, chlordane (0·0225%) or heptachlor (0·005%) added to the standard hot water bath gave satisfactory control of bulb fly, and neither treatment adversely affected growth. The practical applications of the control methods are discussed.—N.A.A.S., Starcross, Exeter. [For earlier reports see *H.A.*, 26: 920 and 27: 708.]

2727. Ministry of Agriculture, London.
Bulb scale mite.
Adv. Leafl. Minist. Agric. Lond. **456**, 1956, pp. 4, illus.

Hot-water treatment of dormant bulbs at 110° F. for 1½ hours is the best method of controlling *Tarsonemus laticeps*, which can be a serious pest of forced narcissus bulbs.

2728. Marcussen, K. H.
Commercial tulip culture in New Zealand.
N.Z. J. Agric., 1957, **94**: 21-31, illus.

Among the aspects covered are the acclimatization of imported bulbs, common pests and diseases, harvesting drying, storing, grading and packing of bulbs, and marketing of cut flowers. For climatic reasons South Island would appear to offer the best prospects.

2729. Minnhaar, —.
Tulpentreiberei ohne Frostschäden. **(Tulip forcing without frost damage.)**
Dtsch. GartenbWirtsch., 1957, **5**(1): 13-15, illus.

Boxed tulip bulbs for forcing may be kept cool during the autumn rooting period by placing the boxes in well-ventilated cellars or by setting them below soil level in troughs to which the cold night air, but not the sun's rays, is allowed access. Red light for forcing gave better results than darkness, resulting in longer and relatively stronger stems.

2730. Fowden, L., and Steward, F. C.
Nitrogenous compounds and nitrogen metabolism in the Liliaceae. II. The nitrogenous compounds of leaves of the genus *Tulipa*: environmental effects on the composition of *Tulipa gesneriana*
Ann. Bot. Lond., 1957, **21**: 69-84, bibl. 12.

A comparative study of the amino-acids that occur free in the leaves of 14 different species of *Tulipa* has been made. γ-Methylene glutamine varied from as much as 60–70% of the amino-acid nitrogen down to levels below those which permit its chromatographic detection. The effects of temperature during growth and of diurnal variation on the N compounds of the leaves *T. gesneriana* are described. The occurrence and metabolism of γ-methylene glutamine in *T. gesneriana* leaves may be regarded as additional to, and superimposed upon, an otherwise typical pattern of N metabolism: in these leaves γ-methyleneglutamine does not assume the role usually discharged by glutamine. [From authors' abstract.]—Cornell Univ., Ithaca, N.Y.

Lawns.

(*See also* 2762m. 2763m.)

2731. KELSHEIMER, E. G.
The hunting billbug a serious pest of *Zoysia.*
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 415-18, bibl. 2, illus.

Control of moderate infestations of the hunting billbug, *Calendra venatus vestita*, may be obtained by spraying with chlordane emulsion at 6 lb. (active) per acre.—Gulf Coast Exp. Stat., Bradenton, Fla.

2732. BESS, H. A., AND OTA, A.
The lawn armyworm and its control.
Hawaii Fm Sci., 1957, **5**(3): 4-5, illus.

Excellent control of *Spodoptera mauritia* was obtained by DDT applied as a wettable powder or emulsion at a rate of about 4 lb. actual DDT in 200 to 225 gal. of water per acre. Chlordane gave poor results.

Succulents.

(*See also* 2762i, y.)

2733. SOUTHEY, J. F.
Observations on *Heterodera cacti* Filipjev et Sch. Stekhoven and *Meloidogyne* spp. on imported cactus plants with a list of new host records.
Nematologica, 1957, **2**: 1-6, bibl. 14, illus.

These 2 nematodes seriously damage the root systems of cactus plants. They may be controlled by cutting off the roots or taking stem cuttings and rooting in a sterilized soil mixture or sand. In a preliminary test hot water treatment has also given good results.—Plant Path. Lab., Harpenden.

2734. RÜNGER, W.
Über den Einfluss der Temperatur und der Tageslänge auf die Blütenbildung von *Euphorbia splendens* Bojer. **(The effect of temperature and daylength on flower formation in *Euphorbia splendens.*)**
Gartenbauwiss., 1956, **3**: 239-49, bibl. 3, illus.

Euphorbia splendens was grown at temperatures between 10 and 35° C., and in daylengths of 10 and 15 hours. At temperatures of 20° C. and over flowers were formed only in short days, but at 15° C. and below flower formation occurred at both daylengths. After equal periods of treatment short days at 30° C. induced the greatest number of inflorescences; low light intensity reduced inflorescence number. At 10° C. flower formation was still possible, but a long period of treatment at this temperature had an injurious effect. The speed of inflorescence and of leaf development increased to a maximum at 30° C. Numbers of leaves formed before the inflorescence increased with increases in temperature up to 20 and 25° C. and then decreased.—Inst. ZierpflBau, Techn. Hochsch. Hannover.

2735. BESTAGNO BIGA, M. L.
Marciume e disseccamento dell'*Euphorbia hermentiana* Lem. e specializzazione del *Coniothyrium concentricum* (Desm.) Sacc. **(Rot and desiccation of *Euphorbia hermentia* and specialization of *Coniothyrium concentricum.*)** [English summary 10 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 40-54, bibl. 21, illus.
Protezione di piante grasse dal marciume da *Coniothyrium* con zineb. **(Protection of succulent plants against *Coniothyrium* rot by zineb.)**
Not. Mal. Piante, 1957, No. 40/41, p. 145.

A specialized form, *gattefossei*, of *Coniothyrium concentricum* attacks plants of Euphorbiaceae. It was controlled in *Euphorbia hermentiana* by cutting out diseased tissue with a hot scalpel and applying zineb to the wounds, but this disfigured the plants and reduced their commercial value. Preventive measures advised include spraying with 0·3% zineb at 10-day intervals and dusting wounds with zineb when taking cuttings.—Osserv. Mal. Piante, Pavia.

Roses.

(*See also* 2061, 2684, 2762n, 2763i, m.)

2736. NATIONAL ROSE SOCIETY OF GREAT BRITAIN.
The rose annual, 1957.
National Rose Society, London, 1957, $8 \times 5\frac{1}{2}$ in., pp. 166, illus., 8s. 6d.

Among the many interesting articles in this annual are descriptions of 5 noteworthy rose gardens, accounts of the hybrid pernetiana rose and comments on *Hulthemia* × *Rosa* hybrids, and advice on mulching roses, on foliar feeding, on growing roses in smoky districts and on growing roses under glass. Notes on varieties are given by several authorities, and rose shows are reported on. Among the illustrations are 15 coloured plates of new varieties.

2737. BÖHNERT, E., AND MÜHLENDYCK, E.
Sortenbeobachtungen an Treibrosen. **(Varietal observations with forcing roses.)**
Gartenbauwiss., 1956, **3**: 208-27.

Flower production was recorded for 20 rose varieties on *Rosa canina* stocks, and the characteristics of 19 varieties are summarized and evaluated.—Inst. Blumen- u. ZierpflBau, Tech. Univ. Berlin.

2738. ROWLEY, G. D.
Germination in *Rosa canina.*
Reprinted from *Amer. Rose Annual*, 1956, pp. 70-3, bibl. 4, illus.

An account is given of various experiments carried out at John Innes Horticultural Institution, from which the following general procedure has been developed for conditioning *R. canina* seeds, so that they germinate the following spring. The hips are harvested as soon as they are ripe in the autumn, opened immediately and the achenes cleaned. They are stratified in tall pots of moist vermiculite screened through an appropriate sieve so that the seeds can be sifted free with ease in the spring. These pots are put in a warm greenhouse for 2 months and then transferred to a

refrigerator for a further 2 months. Finally the achenes are sifted out and sown in the normal way.
J.R.L.

2739. McFadden, S. E., Jr.
Mist propagation of roses.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 333-6, illus.

In tests with 8 rose species and varieties, being tested as rootstocks, cuttings were rooted under continuous mist. Rooting percentages, ranging from 50 to 100%, appeared to be related to the time required by each type for roots to develop. Buds of Happiness (H.T.) and Spartan (flor.) were also inserted in rootstock cuttings prior to rooting, and the bud wrapped in a waterproof wrap. The results obtained with these under mist were comparable or superior to those obtained by grafting established rootstocks. Stem cuttings of the 2 scion varieties also rooted readily.—Univ. Fla, Gainesville.

2740. Carra, P.
Porte-greffes éventuels pour rosiers. **(Possible rootstocks for roses.)**
Rev. hort. Algér., 1956, **60**: 210-13.

In preliminary trials with 15 rootstocks at the Hamma Experimental Garden, Docteur Huey, *Rosa indica inerme* and *R. canina inerme* have so far given the best results.

2741. McFadden, S. E., Jr.
Comparison of 'Happiness' rose production on four rootstocks.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 368-70.

The performance of scions of the H.T. variety Happiness on *Rosa fortuneana*, *R. multiflora*, *R. odorata* and var. Dr. Huey is recorded. *Rosa fortuneana* showed a marked superiority over the other 3 rootstocks, producing more vigorous growth and more flowers.—Univ. Fla, Gainesville.

2742. Staikov, V. M.
The influence of light and temperature on bud formation in the oil-bearing rose. [Russian, with English summary 7 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(3): 49-52, bibl. 6.

Winter chilling was found to be necessary for flower bud formation in *Rosa damascena*, but different photoperiodic treatments applied after foliation had no effect on bud development.

2743. Staikov, V. M., and Zolotovich, G. D.
Studies on the relationship between the development and essential oil content of rose flowers. [Russian, with English summary 5 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(3): 41-4, bibl. 1, illus.

Essential oil content increased with the development of the buds, reached its maximum in the fully opened flower and then began to decrease rapidly before petal fall. The quality of the oil changed in a similar manner. The largest number of fully opened flowers was found between 5 and 9 a.m., and this is the most suitable time for picking.

2744. Staikov, V. M., and Zolotovich, G. D.
The diurnal cycle of the essential oils in rose flowers (*Rosa damascena*). [Russian, with English summary 3 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(3): 45-8, bibl. 6.

The quantity of the essential oil in rose flowers was greatest and its quality highest between 5 and 9 a.m.

2745. Staikov, V. [M.], and Zolotovich, G. [D.].
Localisation de l'huile essentielle dans la fleur de *Rosa damascena* Mill. **(Localization of the essential oil in the flowers of *Rosa damascena* Mill.)** [Russian summary 6 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(4): 37-40, bibl. 4, illus.

All organs of the flower contained essential oil, the greatest quantity being found in the petals which accounted for over 92% of the total oil content. There was no appreciable difference in the quality of the oil obtained from different parts of the flowers.

2746. Kott, V.
Studie obsahu a stability L-askorbové kyseliny v šípcích. **(The content and stability of L-ascorbic acid in rose hips.)** [English, Russian and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 1101-22, bibl. 27, illus.

The L-ascorbic acid content of rose hips increased with ripening, reached its maximum at physiological maturity and then began to decrease in overripe fruit. The vitamin contents found in 17 species is tabulated. It was highest in *Rosa roopae* averaging 2,790 mg./% at physiological maturity and lowest in *R. spinosissima* averaging 270 mg./%. Storage trials in common, SO_2 and CO_2 stores at 0° C. and 18° C. have shown that the vitamin content decreased least in physiologically mature fruit stored at 0° C. in an atmosphere containing 5% SO_2.

2747. Rogers, M. N.
Some effects of moisture and of leaf-temperature depression on the development of powdery mildew of roses.
From abstr. in *Phytopathology*, 1957, **47**: 29.

Different relative humidities at the surface of leaves were obtained by exposing plants to controlled conditions within a specially constructed chamber having 1 refrigerated wall. Leaves lost heat by radiation to this cold surface more rapidly than did the air adjacent to them. Consequently, leaf temperatures below air temperatures occurred. Leaf R.H. values varying from 55 to 100% resulted in no significant differences in the severity of powdery mildew (caused by *Sphaerotheca pannosa* var. *rosae*) until condensation on the leaves occurred. Repeated cycles of high (90%) and low (30%) ambient R.H. following inoculation likewise had no significant effect on disease severity. Intermittent mist applied immediately following inoculation inhibited mildew development, particularly spore germination. The degree of inhibition was related to the length of exposure. Mist applied following infection caused no immediate reduction in mycelial growth or in sporulation; however, if the treatment was continued for 5–6 days, collapse of the conidia was noted.

2748. Sher, S. A.
Response of roses to field fumigation for lesion nematode.
From abstr. in *Phytopathology*, 1957, **47**: 31.

A field heavily infested with *Pratylenchus vulnus* was treated, prior to planting roses, with the following: chloropicrin at 33 gal./acre, Vapam at 40 gal./acre, D-D at 40 gal./acre, and Dowfume W-85 at 8 gal./acre. Chloropicrin was applied with a hand-injector gun and D-D and Dowfume W-85 with a commercial chisel applicator; Vapam was applied as a drench and also chiselled into the soil. Nine months after planting all the treated plants showed a visible response. The average dry weight in grams of the tops of 10 plants from each treatment were: chloropicrin, 82; Dowfume W-85, 71; D-D, 70; Vapam injection, 59; Vapam drench, 39; control, 30. Roots were correspondingly larger and cleaner than those of the controls. The increase in plant growth was correlated with a decrease in number of lesion nematodes around the roots.

Other trees and shrubs.

(*See also* 2036, 2063, 2286, 2321, 2324, 2675, 2676, 2686, 2762c-e, h, t-v, 2763c, f, m, p, r.)

2749. Rünger, W.
Untersuchungen über den Einfluss der Temperatur auf die Wurzelbildung der Steckhölzer einiger Ziersträucher. **(The effect of temperature on root formation in cuttings of certain ornamental shrubs.)**
Gartenbauwiss., 1956, **3**: 59-84, bibl. 12, illus.

The cuttings were of *Deutzia magnifica*, *Forsythia intermedia* var. *spectabilis*, *Lonicera tatarica* and *Philadelphus inodorus* var. *grandiflorus*. Temperature effect on root formation varied from species to species both in range and optimum. Early and late trials varied in their results. A higher temperature was better at an early stage than later. In protracted experiments damage occurred to leaf and root shoots at higher temperatures (20 to 29° C. according to plant). In some cases death was the result: the reasons for this are discussed. Particular advances in the development of the root system (main and subsidiary root formation and extension of growth) proceed best at particular temperatures. Thus subsidiary roots generally grow best at high and main roots at low temperatures. Apparently other factors such as light and air humidity also affect the influence of temperature. The effect of light was palpably obvious, but there was no definite proof of the effect of other factors. [From author's summary.]—Inst. ZierpflBau, Tech. Hochsch. Hannover.

2750. Schuder, D. L.
Borers and their control.
Amer. Nurserym., 1957, **105**(6): 140-4.

The problem of borer attack on ornamental nursery stock is discussed. In a comparative trial of various wraps for borer control aluminium foil was the easiest to handle. Burlap was the best material for impregnation with insecticides.

2751. Maatsch, R., and Rünger, W.
Über das Wachstum einiger verschieden alter Ziersträucher in Abhängigkeit von der Witterung. **(The growth of ornamental shrubs of different ages in relation to weather.)**
Gartenbauwiss., 1956, **3**: 228-38.

One-year-old plants of *Deutzia magnifica*, *Forsythia intermedia* var. *spectabilis* and *Weigelia florida* were given the same treatments and their growth observed from 1950 to 1952. Comparisons between the species showed that vegetative growth was related to temperature and soil moisture. *Weigelia* was less sensitive to drought than *Forsythia* and *Deutzia*. Temperature responses were less marked but the optimum temperature for *Forsythia* growth was higher than that for *Deutzia* and *Weigelia*. Growth was less in years when soil moisture was low at the beginning of the year. Years favourable to growth were those with high soil moisture until late August, and high temperatures in May and June.—Inst. ZierpflBau, Tech. Hochsch. Hannover.

2752. Antipov, V. G.
The effect of smoke and gases discharged by industrial plants on the seasonal development of trees and shrubs. [Russian.]
Bot. Žurnal, 1957, **42**: 92-5, bibl. 11.

Phenological observations conducted on trees and shrubs growing close to 3 chemical factories and in a park in Leningrad have shown that gaseous fumes affected their development. While foliation was, in general, delayed only slightly, leaf fall was advanced considerably. Most susceptible were *Caragana arborescens* with 38 and 69 days' reduction in vegetative period, *Padus racemosa* with 22 and 46 days and *Ulmus laevis* with 14 and 41 days. The vegetative period of *Populus balsamifera*, *Alnus incana* and *Quercus robur* was reduced by only a few days, and these and some other species showing similar resistance are recommended for planting near chemical factories. The effects of the fumes on the dates of flowering, fruiting and yellowing of leaves are also recorded.

2753. Wolf, F. T.
Changes in chlorophylls *a* and *b* in autumn leaves.
Amer. J. Bot., 1956, **43**: 714-18, bibl. 27.

In tests with 25 species of ornamental trees, it was found that 69·7–96·2% of the total chlorophylls had disappeared in the yellow leaves, compared with those in the green leaves sampled from the same species at the same time. The destruction of chlorophyll *a* proceeded more rapidly than that of chlorophyll *b*.—Vanderbilt Univ., Nashville, Tenn.

2754. Coggeshall, R.
The propagation of Asiatic maples.
Amer. Nurserym., 1957, **105**(9): 9-10, 96-9, illus.

Softwood cuttings of 10 species of Asiatic maple were taken from mature plants or from forced young seedlings in the Arnold Arboretum at various times throughout the growing season. Tip cuttings 2–4 in. long were used, and were rooted in coarse sand under a plastic frame. Rooting took 4–12 weeks depending on the species. Cuttings rooted best when taken early in the season, and when taken from young rather than mature plants. Wounding the base of the cutting was definitely beneficial. The growth substance giving the best results was Hormodin No. 3 in powder form. Some species, i.e. *Acer mivabei*, *A. mandschuricum* and *A. griseum*, only rooted to a limited extent from soft wood cuttings.

2755. Singh, J. P.
The effect of some new growth regulating substances on rooting of coleus cuttings.
Indian J. Hort., 1957, **14**: 53-7, bibl. 15.

The effect of 2 organic acid compounds on rooting of coleus cuttings was studied. Both 1-naphthoic and 6-quinoline carboxylic acids stimulated root growth at all concentrations tested. Maximum root stimulation was obtained at 100 p.p.m. 1-naphthoic acid and 1,000 p.p.m. 6-quinoline carboxylic acid.—Indian agric. Res. Inst., New Delhi.

2756. Visser, T.
Germination and pollination experiments with *Forsythia*.
Proc. kon. ned. Akad. Wetensch. Ser. C, 1956, **59**: 685-93, bibl. 8.

Moewus concluded in 1950 that self-incompatibility in *Forsythia intermedia* is due to the absence of a specific enzyme in the styles which is necessary to break down an inhibitor present in the pollen. The experiments recorded in the present paper, which are set out in detail, do not support this theory.

2757. Caroselli, N. E.
Juniper blight and progress on its control.
Plant Dis. Reptr, 1957, **41**: 216-18, illus.

Blight, caused by *Phomopsis juniperovora*, is a serious disease of 1- and 2-year-old junipers in the nursery. Where rootstock plants are infected the scions seldom unite. Among various fungicides tested in 1955 and 1956 the best control was provided by Kromad at 2 oz., Merbam at 1 oz. and WK-34 at 1·2 oz., each in 10 gal. water.—R.I. agric. Exp. Stat.

2758. Vološin, M. P.
The relationship of laurel to light.
[Russian.]
Bot. Žurnal, 1956, **41**: 1652-6, bibl. 10, illus.

Laurel grows best in full light, though it can adapt itself to shade. Observations at the Nikitskij Botanic Garden, Yalta, have shown that the aerial parts of 15-year-old trees grow for 105–110 days in full light, 61–74 days in half shade and 40–62 days in full shade. The total growth increment was 1½ to 2 times greater in light than in shade owing to more intensive photosynthesis. The essential oil content of the leaves was about 3 times higher in exposed plants than in shaded plants.

2759. Patterson, U. L., Jr.
High pressure fog system an efficient humidity controller.
Flor. Exch., 1957, **128**(2): 15, 50-1.

A system of fan and mist cooling has lowered summer temperatures in greenhouses by an average of 21° F. in North Carolina. Rooting of poinsettia cuttings was quicker under high pressure fog and fans than under normal methods of propagation.

2760. Alexander, P. M.
Etiology and control of poinsettia root and stem rot.
From abstr. in *Phytopathology*, 1957, **47**: 1.

Over 90% of the isolates obtained from diseased poinsettias in a 4-year study were identified as *Rhizoctonia solani*. The only other pathogenic organism found was a *Pythium* species. Various drenches were tested for control of *R. solani* on poinsettias grown in sand or in soil of high organic content. Semesan (30% 2 chloro-4-(hydroxymercuri) phenol) and Pano-Drench 4 (0·6% cyano(methylmercuri) guanidine) were equally effective in both media. Captan, Terrachlor and zineb were effective as sand drenches but not as soil drenches. Ferbam was ineffective.

2761. Fanning, J. P.
Leaf-soil and rhododendrons.
Gdnrs' Chron., 1957, **141**: 102.

Investigations were carried out at the National Botanic Gardens, Glasnevin, Dublin, on some rhododendron plants which were growing poorly in beds composed of mountain loam and peat top-dressed with a mixture of peat, sand, loam and leaf-soil, overlying soil with a pH of 7·4 to 7·6. The trouble was traced to the leaf-soil used in the top-dressing, which had a pH value of 7·8 and contained 1·78% Ca. Within 2 years this material decomposed and the Ca accumulated in the beds, raising their pH to 7·2 to 7·4. However, 16 *Rhododendron* spp., including *R. praecox* and *R. ponticum*, continued to grow and flower reasonably well under these conditions. J.R.L.

Noted.

2762.

a Bali, P. N., and Tandon, S. L.
Colchicine induced polyploidy in relation to floriculture.
Indian J. Hort., 1956, **13**: 149-57, bibl. 57.
A review.

b Bopp, M.
Untersuchungen über die Verteilung und Vererbung von Anthocyan in den Blättern von Begonien. **(Studies on the distribution and inheritance of anthocyanin in begonia leaves.)**
Planta, 1957, **48**: 631-82, bibl. 123, illus.

c Borzini, G., and Gallucci Rangone, M. M.
In pioppicultura. Consequenza di un freddo eccezionale nei vivai. **(Poplar cultivation. Result of exceptional cold in nurseries.)**
Inf. fitopat., 1956, **6**: 309-11, illus.
Susceptibility as affected by variety and nutrition.

d Brierley, P., and Lorentz, P.
Hydrangea ringspot virus, the probable cause of "running out" of the florists' hydrangea.
Phytopathology, 1957, **47**: 39-43, bibl. 4, illus.
For a preliminary account see *H.A.*, 27: 738.

e BROERTJES, C.
Toepassing van atoomenergie in de boomkwekerij. **(The use of atomic energy in arboriculture.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 127-30, 190, illus.
A review; studies on neutron treatment of clematis and forsythia seeds are in progress.

f CAVE, M. S., AND BROWN, S. W.
The detection and nature of dominant lethals in *Lilium*. III. Rates of early embryogeny in normal and lethal ovules.
Amer. J. Bot., 1957, **44**: 1-8, bibl. 8.
Lethal ovules of *L. formosanum*, fertilized by X-ray treated pollen.

g CHIAPPINI, M.
Reperti teratologici in *Tulipa gesneriana* L. var. *spathulata* (Bert.). **(Chimeras found in *Tulipa gesneriana* var. *spathulata*.)** [English summary 8 lines.]
Nuovo G. bot. ital., 1955 (issued 1956), **62**: 448-54, bibl. 21, illus.
Supernumerary leaves, flowers and flower parts in one plant.

h CORBETT, M. K.
Virus ring spot of *Peperomia obtusifolia* and *Peperomia obtusifolia* var. *variegata*.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 357-60, bibl. 3.
Symptoms and the maintenance of clean planting stock.

i DONALD, J. D.
Guide to the Rebutinae. Part I. The nomenclature of the Rebutinae. Part II. Key to the Rebutinae.
Nat. Cactus Succ. J., 1957, **12**: 2-8 and 9-11, bibl. 22, illus.

j FEDOROV, A. A.
Some abnormalities in tulips and the importance of these anomalies for the knowledge of the morphological structure of *Tulipa*. [Russian.]
Bot. Žurnal, 1956, **41**: 681-9, bibl. 11, illus.

k GOVI, G.
I sistemici contro i fitofagi delle piante ornamentali. **(Systemic insecticides for the control of pests of ornamental plants.)**
Inf. fitopat., 1956, **6**: 366-8, illus.
Systox, Thimet and malathion against scales and aphids on pot plants.

l GRAHAM, D. C.
Chrysanthemum flower distortion disease in south-east Scotland.
Plant Path., 1957, **6**: 15-17, bibl. 3.
Extensive distribution among planting stocks, especially early varieties.

m GREENFIELD, I.
Controlling turf pests.
Gdnrs' Chron., 1957 **141**: 292-3, illus.

n IVANOFF, D., AND OTHERS.
Dosage chromatographique des hydrocarbures dans l'huile de roses. **(Chromatographic determination of hydrocarbons in rose oil.)**
C.R. Acad. bulg. Sci., 1955, **8**(4): 29-32, bibl. 10.

o KAMEMOTO, H., AND NAKASONE, H. Y.
Uniwai—a dark sport of "pink" carnation.
Hawaii Fm Sci., 1957, **5**(3): 5, illus.
Promising for the lei trade.

p KOFRANEK, A. M., AND LEISER, A. T.
Carnation mother blocks tried under California conditions.
Carnation Craft, Nov. 1956, reprinted in *Flor. Exch.*, 1957, **128**(5): 45.
A high rate of cutting production from a trial mother block.

q KÜHLE, G.
Topfpflanzen erdelos kultiviert. **(Soilless cultivation of pot plants.)**
Dtsch. Gartenb., 1957, **4**: 62-5, bibl. 4, illus.
Chiefly foliage plants.

r LAMPRECHT, H.
Die Art-Kreuzung *Chrysanthemum carinatum* Schousb. × *Chr. coronarium* L. und reziprok. **(Interspecific crosses between *Chrysanthemum carinatum* and *C. coronarium*.** [English summary ¾ p.]
Agri hort. genet., 1956, **14**: 203-54, bibl. 17, illus.
A study of the genetic barrier between the species.

s (LANGHANS, R. W.)
Blindness in iris can be eliminated.
Flor. Exch., 1957, **128**(2): 9.
Temperature programme for forcing Wedgewood iris.

t LEDIN, R. B.
Twelve bauhinias for Florida.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 388-98, illus.
Notes on culture and descriptions of 12 species.

u LEDIN, R. B., AND MENNINGER, E. A.
Bauhinia—The so-called orchid trees.
Nat. hort. Mag., 1956, **35**: 183-200, illus.
Descriptions, with a key, of 32 spp. grown in U.S.A.

v LI, H. L.
Chromosome studies in the azaleas of eastern North America.
Amer. J. Bot., 1957, **44**: 8-14, bibl. 14, illus.
Interspecific fertility is high.

w LINDQUIST, B.
A greenhouse culture of *Disa uniflora* Berg. in Gothenburg.
Acta Horti gotoburg., 1956, **20**: 57-64, bibl. 11, illus.
Experience over 25 years at the Botanic Garden, Gothenburg.

x MAATSCH, R., AND KAEVER, R.
Frühblühende Cyclamen. Über die Bedeutung der Herkunft und der Temperatur für die Blütezeit der Cyclamen. **(Early flowering cyclamen. The importance of origin and temperature for the time of cyclamen flowering.)**
Gartenwelt, 1957, **57**: 2-3.
Seed source as well as temperature affects earliness.

y MCQUOWN, F. R.
Abnormal growth of grafted cacti.
Gdnrs' Chron., 1957, **141**: 182-3, illus.
Zygocactus and *Schlumbergera* on *Selenicereus*.

z MCWHORTER, F. P.
A localized occurrence of cucumber mosaic virus in gladiolus.
Plant Dis. Reptr, 1957, **41**: 141-2.
Including symptoms or lack of them shown by different varieties.

2763.

a MAMELI-CALVINO, E.
Gli agapanthus. **(Agapanthus.)**
Ital. agric., 1957, **94**: 40-8, bibl. 6, illus.
Cultivation and propagation, with notes on origin of types.

b MATHISEN, C.
Dyrking av cyclamen i veksthus. **(Cyclamen growing in the glasshouse.)**
Gartneryrket, 1957, **47**: 271-2, illus.
Methods used at the Norwegian Coll. Agric.

c MELLO, H. DO A.
Nota prévia sôbre a enxertia de borbulha em eucaliptos. **(Preliminary note on grafting budwood in *Eucalyptus*.)**
Rev. Agric. Piracicaba, 1957, **32**: 7-8.
Grafting not successful but shield budding promising.

d DE MOL VAN OUD LOOSDRECHT, W. E.
Das holländische Krokus-Sortiment im allgemeinen und das des *Crocus aureus* insbesondere (Bastardierung, Bastardwüchsigkeit, Polyploidie). **(The Dutch variety list of *Crocus* in general and that of *Crocus aureus* in particular (hybridization, hybrid vigour, polyploidy).)**
Gartenbauwiss., 1956, **3**: 177-207, bibl. 27, illus.

e MORGENTHAL, J.
Die Eigenschaften und Merkmale der tetraploiden Formen und F_1-Hybriden von *Antirrhinum majus* L. **(The properties and characteristics of tetraploid forms and F_1 hybrids of *Antirrhinum majus*.)**
Saatgut-Wirtsch., 1957, **9**: 5-7, bibl. 5, illus.

f PARMENTIER, C.
L'hortensia. Préparation de la plante à forcer. **(Preparation of hydrangeas for forcing.)**
Bull. hort. Liège, 1957, **12**: 105-6.

g PARRETT, R.
Russell lupins: propagation and selection.
North. Gdnr, 1957, **11**(2): 15-18, illus.
Propagation from seed and cuttings, with a list of recommended varieties.

h VAN DE POL, P. H., AND RAUWS, E. I.
The influence of commodity, packing material and the properties of the fumigation chamber on the concentration of hydrocyanic acid in the gas phase.
Landbouwk. Tijdschr., 1957, **5**: 115-26, bibl. 6.
Mainly in bulb stores.

i ROSEN, H. R.
Spraying with copper oxychloride sulfate for the control of black spot and powdery mildew of roses.
Plant Dis. Reptr, 1957, **41**: 209-10, bibl. 3.
Good control obtained without plant injury in a public garden.

j ROSS, M. E.
Scented-leaved geraniums.
Nat. hort. Mag., 1956, **35**: 225-34, illus.
Descriptive list of nearly 60 species and varieties.

k SCHALT, W., AND SAURE, M.
Untersuchungen über den innerbetrieblichen Transport im Zierpflanzenbau mit dem Ziel der Kostensenkung. **(Studies on internal transport in ornamental nurseries with the aim of lowering costs.)** [English, French and Spanish summaries 8 or 10 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 1-20.
In Berlin nurseries mainly concerned in growing pot plants.

l SHIBUYA, R.
Intercrossing among pink calla, white-spotted calla and yellow calla. [In English and Japanese.]
Kasai Publishing and Printing Co., Tokyo, 1956, 10×7 in., pp. 57+plates pp. 27.
Detailed genetical studies described with many excellent illustrations.

m SOMERVILLE, A. M., JR., YOUNG, V. H., JR., AND CARNES, J. L.
Occurrence of plant parasitic nematodes in soil and root samples from declining plants in several States.
Plant Dis. Reptr, 1957, **41**: 187-91, bibl. 6.
Species found in association with declining boxwood, roses, trees and turf.

n STOUTEMYER, V. T.
Container plant growing.
Amer. Nurserym., 1957, **105**(9): 86-90.
Types of container, growing media, drainage and nutrition.

o STRYDOM, J. C.
When is lime really necessary in the flower garden?
Fmg S. Afr., 1957, **32**(12): 52-7, illus.
Including a list of optimum pH levels for several ornamentals.

p TAYLOR, J.
Rhododendron propagation.
Gdnrs' Chron., 1957, **141**: 100-1, illus.
From seeds, cuttings, and layers and by stem or root grafting.

q VALENTINE, D. H.
Studies in British primulas. V. The inheritance of seed compatibility.
New Phytol., 1956, **55**: 305-18, bibl. 16.
In reciprocal crosses between *P. elatior*, *P. vulgaris* and *P. veris*.

r WEST, E., AND MILLER, H. N.
Some notes on *Philodendron* hybrids.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 343-7, illus.
Leaf forms described and illustrated.

s WINSTEAD, N. N., AND SKOTLAND, C. B.
Eradicant treatments for narcissus bulbs and gladiolus corms harboring soybean nematode cysts.
Phytopathology, 1957, **47**: 67-9, bibl. 8.
Bulbs and corms, though not hosts, may carry *Heterodera glycines*.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 2093, 2997, 3024j.)

2764. RENAUD, M.
Israel et le 4^{me} Congrès International de l'Agrumiculture Méditerranéenne. **(Israel and the 4th International Congress of Mediterranean Citrus Growers.)**
Fruits et Prim., 1956, **26**: 409-20, illus.

The first part of this article is devoted to an account of the organization of agriculture and, in particular, fruit growing in Israel and the second to the Proceedings of the Citrus Congress, which will doubtless appear later more fully in published form. In comparing the conditions under which horticulture is conducted in Algeria and Israel the author affords a clear view of the main features of the very intensive Israeli organization. Among subjects specifically dealt with are soil irrigation, climate, size of farms, organization of production aimed at the elimination of waste, research and education. Fundamental research is based on work at the Weizmann Institute. For specialized agricultural research the Institute at Rehovot is responsible with a scientific personnel of more than 130, 17 laboratories and 970 ha. of land, 420 of them being at Beit-Dagon. Further the Government Department of Horticulture, which is responsible for the advisory services, has under it 6 small stations as follows: Sarafand, mainly for citrus work; St. Jean d'Acre for vines, pome, stone and subtropical fruits; Beit Shan for olives, dates and table grapes; Zémach for dates; Farradia for dry land cultures; Mishmar Haemek for various crops other than vines and citrus. The officers of the department are specialists in the best sense of the word. Higher agricultural education is provided by the Agricultural Faculty of the Hebrew University of Jerusalem and of Rehovot and by the Faculty of Agricultural Engineering of the Polytechnical University of Haifa. Secondary education is given in 17 agricultural schools and in 35 other establishments throughout the country.

2765. MINISTÈRE D'AGRICULTURE, DEPARTEMENT D'HORTICULTURE, ISRAEL.
Guide de la Station de Démonstrations Agrumicoles Sarafand. **(Guide to the Sarafand Citrus Demonstration Station.)**
Govt. Printer, Jerusalem, 1956, pp. 52.

This station, now of 290 dunams, 8 miles from the coast just off the Tel-Aviv–Jerusalem road, is concerned with: variety collections, spacing, rootstock and irrigation trials on various citrus species, the examination of such subtropical crops as avocado, loquat, annonas and guavas and, since 1950, flower and bulb trials. The layout of the different plots is presented.

Avocadoes.

(*See also* 2765, 2827e, q, 2828 l.)

2766. MALCOLM, J. L.
The effects of the longtime avocado culture on the composition of sandy soil in Dade County.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 313-24, bibl. 30.

After 35 years of avocado culture a grove soil was compared with adjoining virgin soil. The most significant change was the accumulation of an acid organic layer on the soil surface. Plant nutrients accumulated in the top 6 in. of soil, among them nitrate N, and Cu. P was the only element which moved in the soil to any significant extent and was retained in the B horizon. Contents of Ca, Mg, Mn, Fe and total K in the B horizon were markedly reduced by avocado culture.—Sub-trop. Exp. Stat., Homestead, Fla.

2767. LYNCH, S. J., AND GOLDWEBER, S.
Some effects of nitrogen, phosphorus and potassium fertilization on the yield and tree growth of avocadoes.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 289-92, bibl. 2.

In an experiment with Lula avocadoes on oolithic soils, the level of N in complete fertilizer applications had a direct beneficial effect on tree growth, fruit yield and size, and tree condition. A 2% N level resulted in very poor tree growth and yields with poor quality fruit at all levels of K and P. At a 4% N level total fruit yields were not affected by variations in K and P, but there was an indication that the highest and lowest levels of K did not favour maximum yields, and that with high K increasing P tended to depress yields. At 6% N, with low P, there was a marked yield increase at 6% K compared with 3% K or no K. Trees of Lula, Booth No. 7 and Waldin were less affected by cold at the higher levels of N.—Univ. Miami, Coral Gables, Fla.

2768. MARTIN, J. P., AND ERVIN, J. O.
Effect of degree of base saturation on tolerance of avocado seedlings to exchangeable Na and K in the soil.
Soil Sci., 1957, **83**: 265-71, bibl. 10, illus.

A study was made of the influence of various exchangeable Na and K percentages on the growth and chemical composition of Mexicola avocado seedlings in acid soil, in base-saturated soil, and in soil containing 2% excess $CaCO_3$. Seedling growth and chemical composition was found to be largely dependent on the available supply of Na or K in the soil, and Ca supply or exchangeable H, over the range studied, was found to exert only minor effects. High exchangeable K or Na reduced Ca absorption more in acid soil than in base-saturated or excess-lime soil, but the reduction was not sufficient to influence growth. Increasing Na or K depressed leaf Ca more than root Ca. Leaf K appeared to be slightly increased by excess $CaCO_3$. [Authors' summary.]—Univ. Calif., Riverside.

2769. GUSTAFSON, C. D.
Zinc soil treatment on avocados.
Citrus Leaves, 1957, **37**(3): 10, and *Calif. Citrogr.*, 1957, **42**: 225-7.

Zinc deficiency symptoms in avocadoes are described. Owing largely to their shallow root system avocado trees respond to soil applications of zinc sulphate. Soil applications produce a slower response (5–14 months, depending on soil type) than foliar sprays, but their effects last longer (5 or more years). Dosages of zinc sulphate containing 23–28% Zn suggested on the basis of trial results, range from 1 lb. for 2-year-old trees to 10 lb. for 20-year-old trees.

2770. ZENTMYER, G. A., AND ERSPAMER, J. L.
Vapam as a soil fumigant and as a chemotherapeutant.
From abstr. in *Phytopathology*, 1957, **47**: 38-9.

Vapam was applied by sprinkler at various rates and dosages to avocado trees infected with *Phytophthora* root rot in southern California. With dosages of 200–250 p.p.m. (active ingredient) at 3–4 gal./sq. ft., kill of *Phytophthora cinnamomi* was obtained to the depth of sampling (24 in.), with no recovery of the fungus 9–12 months after treatment in some cases. With treatment at therapeutic levels, root infection with *P. cinnamomi* was strikingly less when solutions containing 50, 75 or 100 p.p.m. (active ingredient) were used. Infection gradually increased, but after 1 year was still significantly lower than before treatment. Tree injury was appreciable even at the lower dosages, particularly on weak trees, and was severe when temperatures were high during or following treatment. Methyl bromide, chloropicrin and D-D were also effective fumigants against *P. cinnamomi*, but are impracticable for large-scale use.

Citrus—propagation.

(*See also* 2765, 2791, 2803, 2827r, 2828b.)

2771. VERZILOV, V. F., AND MURINSON, B. JU.
The use of plastic film and growth substances in vegetative propagation. [Russian.]
Priroda, 1957, **46**(2): 89-91, illus.

In marcotting experiments with lemon better rooting was obtained when the sphagnum moss was soaked in 0·01% heteroauxin and wrapped in vinyl film than when heteroauxin without the plastic wrap or the wrap without heteroauxin were used.

2772. ČAJLAHJAN, M. H., AND NEKRASOVA, T. V.
The effect of vitamins on overcoming polarity in lemon cuttings. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1956, **111**: 482-5, bibl. 8, illus.

Batches of 14 lemon cuttings were treated at the basal end with 0·2 g./l. heteroauxin, heteroauxin+2·5 g./l. ascorbic acid, heteroauxin+2·5 g./l. thiamin, heteroauxin+0·5 g./l. pyrogallol and water respectively. Similar batches were treated with the same materials at the apical end and all cuttings were then set with the treated ends in sand. After 5 weeks 65 from 69 surviving basally set cuttings had rooted, the treated ones better than the controls, and most of them produced shoots. Of the apically set cuttings those treated with vitamins C and B_1 produced many large roots, two of those treated with pyrogallol produced a few feeble roots, but only the controls produced shoots within the first 5 weeks. The addition of vitamins to heteroauxin had little effect on normally orientated cuttings but in inverted cuttings they induced rooting and subsequently encouraged axillary shoot formation when the plants were grown on in pots.

Citrus—tree composition and nutrition

(*See also* 2243, 2765, 2827c, 2828e, g, i, o, 2831.)

2773. KOO, R. C. J., AND SITES, J. W.
Mineral composition of citrus leaves and fruit as associated with position on the tree.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 245-52, bibl. 6.

1. In leaves, the contents of N, P, Ca and Mg were not appreciably affected by height, while K content decreased as the height from which leaves were sampled increased. In fruits, the contents of N, P and K decreased with height, while Ca content increased. The Mg content was not affected by height of fruit on the tree. 2. The mineral content of leaves and fruits varied in relation to light exposure. The N content of leaves was not appreciably affected except in the summer flush, where N was higher in samples taken from the outside than from the inside sections of the tree. The K content of the leaves varied inversely to light exposure; leaf K was higher in inside than in outside leaves. No consistent variation was found in P and Ca contents of the leaves with respect to light exposures. Mg content was found to be lower in canopy leaves than in either inside or outside leaves. N, P, and K contents of fruit were highest in fruits taken from inside the tree and lowest in the outside fruits. No significant differences were found in the Ca or Mg content of fruits due to light exposure. 3. The position of the leaf on the twig had a distinct effect on mineral composition of the leaf. Wide variations were observed in K and Ca contents, and to a lesser degree in N and Mg contents, between leaves from the tip and from the base of the same twigs. Variations were also found in the level of mineral contents among different growth flushes. 4. There were more fruits in the 6–12-foot zone than in other

height zones, and more in the canopy sector of the tree than on the outside or inside sectors. Inside fruits were larger in size than outside fruits. 5. The possibility of using samples of whole fruit as indexes to the mineral nutrition of the entire tree was studied and is considered worthy of further investigation. [Authors' summary.]—Citrus Exp. Stat., Lake Alfred, Fla.

2774. Goldweber, S., Boss, M., and Lynch, S. J.
Some effects of nitrogen, phosphorus and potassium fetilization on the growth, yield and fruit quality of Persian limes.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 328-32, bibl. 9.

Increasing N applications to Persian limes resulted in increases in per cent juice, soluble solids and titratable acid in the fruit, but had little effect on the solids/acid ratio of the juice. Other effects were increased number of fruits per tree, total yield, rate of growth and relative tree size and darker leaf colour. Individual fruit weight was not affected. Phosphorus increases had no observable effect on per cent juice, soluble solids, titratable acid or solids/acid ratio in the fruit, and did not increase the number of fruits per tree or total yield. Phosphorus level did, however, have a positive effect on trunk growth and relative tree size. Potash increases increased per cent juice and titratable acid but decreased soluble solids in the fruit. Fruit number per tree, total yield and individual fruit weight of Persian limes increased with increasing K levels. Trunk growth, relative tree size and leaf colour were depressed by increasing levels of K.—Univ. Miami, Coral Gables, Fla.

2775. Wander, I. W., and Sites, J. W.
The effects of ammonium and nitrate nitrogen with and without pH control on the growth of rough lemon seedlings.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 211-26, bibl. 15, illus.

In these pot experiments, in which the N source varied from all ammonium to all nitrate N and pH control in half the treatments was attempted by frequent titration with Ca(OH)$_2$ or H$_2$SO$_4$, the most significant points noted were: (a) Titratable acidity and hydrogen-ion activity increased as the amount of ammonium N increased in the nutrient solution. Nitrification was not a factor in these solution cultures. (b) Ammonium N was more readily absorbed when the nutrient solution was frequently titrated to a pH of 5·8 than when allowed to remain acid. Variations in pH had little or no effect on nitrate absorption. K absorption was decreased by increased ammonium concentrations. (c) Total leaf N increased as the ammonium N concentration in the nutrient solution increased. Total leaf Ca, K, and Mg decreased as ammonium N supply increased. (d) Growth decreased as ammonium N supply increased. (e) The cation exchange capacity of the roots increased as the nitrate N supply increased and was the highest for the seedlings receiving all their N as nitrate. The observations made from this experiment indicate that ammonium N absorption, or the resultant acidity produced, can interfere with the absorption of other cations, especially Ca. It is suggested that field practices be followed that will be favourable for rapid nitrification of applied ammonium N sources. [From authors' summary.]—Citrus Exp. Stat., Lake Alfred, Fla. [See also *H.A.*, 27: 1813.]

2776. Wallace, A., and Ashcroft, R. T.
Preliminary comparisons of the effects of urea and other nitrogen sources on the mineral composition of rough lemon and bean plants.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 227-33, bibl. 15.

Urea nitrogen was compared with other nitrogen sources in sand culture studies using bush beans and rough lemon cuttings as test plants. The influence of urea on phosphorus uptake was similar to that of nitrate for the beans but like the ammonium source for the rough lemons. For both species, the effect on cation uptake was more like that of the ammonium ion, although somewhat modified. There were several interactions between nitrogen sources and inorganic composition of plant parts. It was concluded that the urea was hydrolyzed after absorption rather than before. [Authors' summary.]—Univ. Calif., Los Angeles.

2777. Smith, P. F.
Effect of phosphate fertilization on root growth, soil pH, and chemical constituents at different depths in an acid sandy Florida citrus soil.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 25-9, bibl. 12.

Soil samples to a depth of 60 in. were taken in a Pineapple orange grove on an acid, sandy soil after 13 years of differential fertilization with superphosphate. Some increase in P content was noted at all soil levels, but the largest increase was in the top 12 inches. The total weight of "feeder" roots was nearly one-third less in the high P$_2$O$_5$ plots than where no P$_2$O$_5$ was applied. The soil became increasingly acid with superphosphate applications, particularly in the top 12 inches. Increasing P$_2$O$_5$ resulted in more exchangeable K, but exchangeable Ca and Mg were unaffected. There were no differences in total amounts of Cu, Zn or Mn due to treatment.—U.S.D.A., Orlando.

2778. Wenzel, F. W., and others.
Quality of canned grapefruit sections from plots fertilized with varying amounts of potash.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 170-5, bibl. 14.

Fruit from plots treated with 0, 3 or 10% K$_2$O in the complete fertilizer was used in producing canned grapefruit sections during 3 seasons. Quality of the grapefruit sections was affected by time of picking. When fruit was picked at the same time from trees receiving different levels of K$_2$O, the firmness and quality of the grapefruit sections decreased with increasing K$_2$O. Total pectin and water insoluble solids were highest in fruit from the no-K$_2$O plots.—Fla Citrus Exp. Stat., Lake Alfred.

2779. McColloch, R. C., Bingham, F. T., and Aldrich, D. G.
Relation of soil potassium and magnesium to magnesium nutrition of citrus.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 85-8, bibl. 19.

Soil and leaf analyses were made in connection with six field experiments involving orange trees fertilized with potassium and/or magnesium. Experimental plots were located in 6 orchards in 4 southern California counties. The concentration of Mg in spring-cycle leaves was correlated with the degree of leaf symptoms characteristic of Mg deficiency. Addition of Mg fertilizer resulted in a marked increase in leaf Mg and a disappearance of deficiency symptoms. K fertilization accentuated Mg deficiency. Deficiency symptoms were associated with leaf Mg concentrations of 0·20% or less. The ratio of exchangeable K/Mg in the soil (particularly the 18- to 30-inch depth) was highly correlated with the percent Mg in the leaves. [Authors' abstract.]

Citrus—pollination.

2780. Mustard, M. J., Lynch, S. J., and Nelson, R. O.
Pollination and floral studies of the Minneola tangelo.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 277-81, bibl. 7, illus.

Results from a 2-year experiment on the effect of pollen source on yield of Minneola tangelos are given, with observations on the floral anatomy of the tangelo. Fruit set was markedly increased by hand pollination of Minneola flowers with pollen of Seminole tangelo, Lake tangelo, Valencia orange or Pineapple orange as compared with self-pollination.—Univ. Miami, Coral Gables.

Citrus—frost damage, diseases and pests.

(*See also* 2808, 2809, 2827a, f, h, i, k, p-s, v, x, 2828g, h, k, m.)

2781. Ruggieri, G.
In difesa degli agrumeti dalle gelate. Rilievi e considerazioni. **(Protection of citrus orchards from frost. Observations and reflections.)**
Riv. Agrum., 1956, **1**: 449-53, illus.

Damage from frost in Sicily is analysed for a number of orange varieties. Moro, Washington Navel and Sanguinello M. were severely affected. Tarocco a scocca, Sanguinello Moscato S.G.G. No. 1 and Sanguinello S.P. No. 1 were sufficiently resistant to warrant selection for propagation in areas subject to frost.

2782. Romano, A.
Danni da freddo e fusariosi (da *Gibberella baccata* (Wallr.) Sacc.) fra gli agrumeti della Sicilia. **(Injury from cold and fusariosis (caused by *Gibberella baccata*) in Sicilian citrus orchards.)**
Riv. Agrum., 1956, **1**: 463-70, bibl. 1, illus.

Young trees of Tarocco orange on sour orange rootstocks were attacked by the fungus *Fusarium lateritium* (*Gibberella baccata*) after damage by low temperature and cold wind in April, which followed frost injury in February. The fungus entered frost cracks in the bark just above soil level. Frost damage and fungal infection of internal tissues are described.

2783. Taylor, R. H.
Diseases of the lemon.
J. Agric. Vict., 1957, **55**: 179-91, illus.

The following diseases and control measures, when known, are considered: *Tree diseases:* collar rot or brown rot gummosis due to *Phytophthora* spp., armillaria root rot (*A. mellea*), diebacks due to *Diplodia* spp., *Sclerotinia sclerotiorum* and *Botrytis cinerea*, citrus blast due to *Pseudomonas syringae; Fruit and leaf diseases:* brown rot (*Phytophthora*), anthracnose (*Colletotrichum gloeosporoides* and *Alternanthera*), *Septoria* spot; *Superficial diseases:* sooty mould, lichens and algae; and *Virus diseases:* shell bark, lemon crinkle and those which cause incompatibility.

2784. Grimm, G. R.
Preliminary investigations on dieback of young transplanted citrus trees.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 31-4, and *Citrus Ind.*, 1957, **38**(5): 18-20.

Preliminary studies of dieback, which has become increasingly common in newly planted groves, have indicated that the condition may result from injurious transplanting conditions. Pathogens do not appear to be a primary cause of dieback. Lack of leaves or of healthy fibrous roots contribute to the trouble.—U.S.D.A., Orlando.

2785. Calavan, E. C.
Wood pocket disease of lemons and seedless limes.
Calif. Citrogr., 1957, **42**: 265-8, bibl. 7, illus.
Citrus Leaves, 1957, **37**(6): 8-9, 32-3, illus.

The symptoms of wood pocket disease include striking variegated patterns on some of the leaves, shoots and fruit, canker lesions on branches, and sometimes the death of large branches or whole trees. The disease, which has only been found in semi-dense Lisbon lemons and certain seedless limes, appears to be very similar to the disease described as lime blotch from Florida. There is a tendency for each new generation of trees to be more severely diseased than the previous generation. It seems probable that an unstable mutation is responsible for it. It cannot be cured but can be prevented by the use of budwood from healthy sources.

2786. Reitz, H. J., and Knorr, L. C.
Occurrence of Rangpur lime disease in Florida and its concurrence with exocortis.
Plant Dis. Reptr, 1957, **41**: 235-40, bibl. 4, illus.

The presence in Florida of Rangpur lime disease (RLD) is reported. Data presented form the basis for the following factual and theoretical considerations: (1) The etiological agent of Rangpur lime disease appears to be the same as, or at least quite constantly associated with, that causing exocortis in trifoliate orange. (2) The incubation period of RLD in Florida is of the same order as that reported from Brazil and Texas, but is at variance with that from California. (3) Rate of scaling is greater in trifoliate orange than in Rangpur lime. (4) Trees on trifoliate orange rootstocks are uniformly affected by stunting and scaling due to exocortis, but few trees on Rangpur lime are so affected. In view of these findings, it is suggested that Rangpur lime and trifoliate orange should not be used as rootstocks in Florida until distribution of the causal virus in the State's sources of budwood has been studied. [Authors' abstract.]—Citrus Exp. Stat., Lake Alfred, Fla.

2787. Moore, P. W., Nauer, E., and Yendol, W.
California scaly bark disease of citrus.
Calif. Agric., 1957, **11**(2): 8-9, illus.

A survey of 220 orange groves has shown an average of 7·8% of the trees to be infected with psorosis or scaly bark. The effect on the cropping of Valencia orange trees of the disease in its first stage, before appreciable die-back has occurred, was found to be negligible, but in the second stage, when the loss of branches ranged from one main limb to half the bearing surface, yields were reduced to an average of 65% of normal. By the third stage, with ½ to ¾ of the bearing surface destroyed, yields had dropped to 28% of normal. The progress of the disease may be retarded in the early stages by scraping bark lesions or by treating them with DN-75. For replacing casualties trees raised from registered healthy budwood should be used.

2788. Grant, T. J.
Effect of heat treatments on tristeza and psorosis viruses in citrus.
Plant Dis. Reptr, 1957, **41**: 232-4, bibl. 8.

Hot-water treatments of citrus budsticks infected with tristeza and psorosis viruses have not proved satisfactory for securing virus-free bud sources. Some branches on the new growth of infected plants developed during exposure in a high-temperature chamber appeared to be free of tristeza and psorosis viruses, even though old leaves and stem tissues of the treated plants were not. [Author's abstract.]—Hort. Crops Res. Branch, agric. Res. Serv., U.S.D.A.

2789. Desjardins, P. R., and others.
The suppression of tristeza virus symptoms in Mexican lime seedlings by heat treatment.
Plant Dis. Reptr, 1957, **41**: 230-1, bibl. 5.

It has been found that heat treatment at 40° C. results in the suppression of tristeza virus symptoms on the leaves that develop during treatment of infected Mexican lime seedlings. Results of studies of healthy seedlings indicate that the increase in growth during treatment of infected plants is due to the effect of the treatment on the virus rather than on the host. After removal to greenhouse temperatures, symptoms later appeared on some of the younger leaves which had been free of symptoms at the time of termination of treatment and also on leaves which developed subsequent to treatment. [Authors' abstract.]—Univ. Calif., Riverside.

2790. Fisher, F. E.
Control of anthracnose on rough lemon seedlings.
Plant Dis. Reptr, 1957, **41**: 77-8, bibl. 3.

In comparative tests with several fungicides, ferbam gave the best control of anthracnose (*Colletotrichum gloeosporioides*) on young trees and resulted in the largest plants. In further tests, six weeks after the initial applications plants, sprayed with ferbam or zineb had more healthy leaves than those sprayed with captan or copper. These two compounds also gave better control of scab (*Elsinoë fawcetti*) than captan or copper.—Fla Citrus Exp. Stat., Lake Alfred.

2791. Klotz, L. J., DeWolfe, T. A., and Wong, P. P.
Guard against introducing brown rot fungi.
Calif. Citrogr., 1957, **42**: 258.
Heat-treat citrus seed to kill *Phytophthora* brown-rot fungi.
Citrus Leaves, 1957, **37**(5): 14-15, illus.

A large proportion of the seeds extracted from brown rot fruit carry *Phytophthora* in the seed coat, and by planting a single infected seed it is possible to contaminate a whole bed. Tests have shown that soaking the seeds in water at 120° F. for 4 minutes will destroy both *P. citrophthora* and *P. parasitica* without impairing viability.

2792. Thompson, W. L., King, J. R., and Deszyck, E. J.
Progress report of greasy spot and its control.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 98-104, and *Citrus Ind.*, 1957, **38**(4): 5-7, 10-13, both bibl. 11, illus.

Greasy spot infections on citrus were effectively reduced by 2 applications of copper in July and August. Other effective treatments were an oil emulsion spray in July followed in August with 0·27 lb. copper, and a copper spray in June followed by oil in July. Captan and ziram were also effective. Summer copper sprays did not affect soluble solids or acid in the juice of Pineapple oranges or red grapefruit, and, when combined with sprays against scale insects, did not increase subsequent purple mite infestations.—Fla Citrus Exp. Stat., Lake Alfred.

2793. Oršanskaja, V. N., and Ordžonikidze, N. P.
A rapid laboratory method of testing citrus for resistance to mal secco. [Russian.]
Agrobiologija, 1956, No. 5, pp. 35-44, bibl. 9, illus.

Experiments have shown that, just as various species and varieties of citrus react differently to natural and artificial infection by mal secco, so they react differently to the toxin produced by the fungus *Deuterophoma tracheiphila* in a liquid nutrient medium. The resistance of plants is estimated by the time required for shoots placed in an extract of the toxin to wither. The lemon variety Novogruzinskij from an old infected grove withered in 2 hrs–2 hrs 45 min., indicating low resistance, and served as a control. The slightly resistant lemon varieties Eureka, Lisbon and Villafranca withered in 3 hrs 5 min. to 6 hrs 20 min., while the more resistant variety Monacello took from 20 hrs to 23 hrs 30 min. The speed of reaction of other species and varieties is also given with a provisional estimation of their relative resistance.

2794. Romano, A.
Sul possibile impiego dell'antibiotico griseofulvina contro l'agente del mal secco degli agrumi (*Deuterophoma tracheiphila* Petri).
(Possible use of the antibiotic griseofulvin for control of *Deuterophoma tracheiphila*, pathogen of mal secco of citrus.) [English summary 10 lines.]
Not. Mal. Piante, 1957, No. 40/41, pp. 132-6, bibl. 6, illus.

Strong fungistatic action was shown *in vitro* by griseofulvin at 40 μg. per c.c., but the results of experiments with potted citrus plants have been discouraging.

2795. Rubcov, I. A.
Citrus pests and their natural enemies. [Russian.]
Izd. Akad. Nauk S.S.S.R., Moscow and Leningrad, 1954, 8×5 in., pp. 260, bibl. 6 pp., illus., roubles 4.95.

In this book the more important insect and mite pests of citrus occurring in the U.S.S.R. and their predators and parasites are described. The aim is to provide knowledge as a basis for biological control which, while slower in action, is more economical and lasting than chemical control. The importance of chemical control is, however, not underestimated, and the possibilities of harmonizing the two methods are considered.

2796. Puzzi, D., and Orlando, A.
Ensáios de combate às moscas das frutas *Ceratitis capitata* (Wied.) e *Anastrepha* sp. por meio de pulverizações de iscas envenenadas. **(Experiments on control of the fruit flies *Ceratitis capitata* and *Anastrepha* sp. by spraying with poisoned baits.)**
Biológico, 1957, **23**: 21-5, bibl. 7.

The best results in a citrus orchard were obtained by spraying 6 times at 10–12 day intervals with 0·2% dieldrin (50% active) mixed with a 3% solution of brown sugar. Malathion had a rapid initial action, but less residual effect and diazinon was ineffective. For combined control of coccids and fruit flies the alternate use of dieldrin and an organic phosphorus insecticide is advised.

2797. Di Martino, E.
La mosca delle frutta (*Ceratitis capitata* Wied.) sugli agrumi. **(The fruit fly (*Ceratitis capitata*) on citrus.)**
Riv. Agrum., 1956, **1**: 479-502, bibl. 19.

Specific and varietal susceptibility is discussed. Experiments in Sicily from 1950 to 1955 showed that satisfactory control resulted from spraying with 0·5% aqueous DDT 50 from the first appearance of the pest, usually early in September. Excellent results were obtained by repeating the treatment at 20-day intervals until the temperature fell to about 13° C. Longer intervals were satisfactory in cool overcast weather. The onset and course of infestation were determined by setting bottle traps containing 3% aqueous biammonium phosphate. In general, parathion and other phosphoric esters, with or without mineral oils, gave very poor control.

2798. Johnson, R. B.
Notes on the use of Systox for purple mite control of citrus.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 93-7, bibl. 4, and *Citrus Mag.*, 1957, **19**(6): 10-12, 18, bibl. 4.

Systox was found to be effective against purple mite (*Metatetranychus citri*) from late October until February, but was of little value in April. A rate of ½ pint Systox per 100 gal. of spray was superior to DN Dry Mix No. 1 in late October and December, and equal to 1 lb. of Ovotran in February. Brushing-type applications of Systox were as effective as full coverage sprays.—Fla Citrus Exp. Stat., Lake Alfred.

2799. Di Martino, E.
Osservazioni ed esperienze di lotta contro la ruggine gialla del limone dovuta al ragno rosso (*Tetranychus telarius* L.). **(Observations and experiments on control of yellow rust of lemons caused by the red spider mite *Tetranychus telarius*.** [English summary 1¼ pp.]
Ann. Sper. agrar., 1957, **11**: 115-38, bibl. 11, illus.

The lemon varieties Interdonato and Monachello proved very susceptible to the pest. Intercropping of lemon, orange or mandarin with irrigated vegetables increased infestation. During summer good control was achieved with mixtures of ovotran with either aramite, malathion or parathion. From autumn to spring the only one of many insecticides that showed promise was chlorobenzilate.

2800. Johnston, C. J. R.
Red scale.
Citrus News, 1956, **32**: 139-40.

Results are given from a series of trials on the control of red scale in Victoria. E605 at 0·05% parathion, applied in November and January was promising, but Thiophos at the same concentration proved even better. A schedule of one 0·06% parathion spray and one oil spray at 1 : 67 applied before or after the parathion proved highly satisfactory. Miscible preparations of highly-refined, high paraffin content oils did not give the same control of red scale per unit weight of oil applied as did standard oils applied as emulsions. White oil plus malathion treatment has also shown promise. Tests with several brands of emulsion revealed that the amber colour of one emulsion and of the oil separated from it was associated with a high proportion of aromatic compounds which were injurious to citrus fruits.—Dep. Agric., Victoria.

2801. Atkins, A. L., Jr.
Western tussock moth.
Calif. Citrogr., 1957, **42**: 227-8, bibl. 4, illus.

The life history and habits of the western tussock moth, *Hemerocampa vetusta*, is described. In 1956 it did serious damage to the spring growth flush and newly-set fruit of Navel oranges in parts of California. In preliminary trials DDT at 10 lb. 50% w.p. in 800 gal. water per acre gave excellent control of last-instar larvae except for a few which had already pupated.

2802. Wille, J. E.
La plaga de los naranjos en Palpa. **(The orange pest attack in Palpa.)**
Inf. mens. Estac. exp. agric. La Molina, 1956, **30**(353): 6-9.

The white fly *Aleurothrixus floccosus* was controlled by washing the trees with jets of water under high pressure and spraying them 1–2 days later with a 2% oil emulsion containing either 0·05% Folidol E.605 or 0·1% parathion. At least 5 treatments were necessary during the year. Other fungicides tested were either phytotoxic or ineffective. Attempts at biological control have so far proved unsuccessful.

2803. FORD, H. W.
Citrus rootstock selections tolerant to the burrowing nematode.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 44-51, bibl. 10.
The search for a rootstock resistant to citrus spreading decline.
Citrus Mag., 1957, **19**(7): 14-15, 34, bibl. 2.

Three citrus rootstocks have been found which show some tolerance to *Radopholus similis*. Two are rough lemon clones in which growth was reduced by only 10 to 18% by nematode infestation. The third rootstock was unidentifiable, but its growth was not reduced in infested soil and the nematode population always decreased and frequently disappeared. The second paper gives essentially the same information particularly as regards the unidentified rootstock.—Fla Citrus Exp. Stat., Lake Alfred.

2804. TARJAN, A. C.
The possibility of mechanical transmission of nematodes in citrus groves.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 34-7, bibl. 7.

Fourteen genera of known parasitic nematodes, including *Radopholus similis*, were identified in root and soil samples obtained from tracks of bulldozers used in pulling out citrus groves infected with spreading decline. Burrowing nematode-infected citrus roots combined with clay, crushed citrus fruits, and soil were introduced into pots containing 9-month-old citrus seedlings, and the plants were kept in full sunlight or were shaded. Infection only occurred in the shaded plants.—Fla Citrus Exp. Stat., Lake Alfred.

2805. FELDMESSER, J., AND FEDER, W. A.
Use of 1,2-dibromo-3-chloropropane on living citrus trees infected with the burrowing nematode.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 105-6, bibl. 3.

Rates of 1,2-dibromo-3-chloropropane (Nemagon) up to 4 gal. per acre were tolerated by living citrus trees but did not significantly reduce burrowing nematode populations or improve growth. Higher concentrations were not tolerated by living citrus trees.—U.S.D.A., Orlando.

2806. BAINES, R. C., AND OTHERS.
Results with vapam to control nematodes, fungi.
Calif. Citrogr., 1957, **42**: 192, 202-8, illus.
Nematode and Phytophthora control by vapam.
Citrus Leaves, 1957, **37**(5): 6-8, 24, 32-3, illus.
Control of the citrus nematode and *Phytophthora* spp. by vapam.
Plant Dis. Reptr, 1957, **41**: 405-14, bibl. 2, illus.

The citrus nematode, *Tylenchulus semipenetrans*, was effectively controlled when 274 to 500 lb. vapam per acre were applied in 6 to 12 surface inches of water in basins. The low doses were effective on sandy loams and the high doses on loam soils. The treatments also decreased the number of non-parasitic fungi. The brown rot fungi, *Phytophthora citrophthora*, *P. parasitica* and *P. syringae*, were killed by 400 lb. vapam per acre applied in 5 to 6 surface inches of water in basins on sandy loam soils. Control of the nematode and brown rot fungi was unsatisfactory when vapam was injected into the soil followed by cultivation or irrigation, or when it was applied to the surface and sprinkled, or applied in water by furrows or sprinklers. However, on a gravelly soil 400 lb. vapam per acre in 5 surface inches of water applied by sprinklers controlled the nematode but not *P. syringae*. Large basins, 10 × 10 ft. or larger, around the tree site should be treated where possible. Duration of the favourable growth responses and thus the merits of the treatments have not been fully evaluated as yet. [From authors' summary.]

2807. MARTIN, J. P., BAINES, R. C., AND ERVIN, J. O.
Influence of soil fumigation for citrus replants on the fungus population of the soil.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 163-6, bibl. 11.

Fumigants used included D-D, CS_2, chloropicrin, ethylene dibromide and vapam. It was found, in general, that after marked reduction or near destruction of the fungus populations of the soils, especially of the subsoils, fungi again became established, but represented relatively few species in comparison with those in untreated soils. Numbers remained relatively low in some soils or attained higher magnitudes than in the non-fumigated soils in other plots. Additional species returned with time, but even after 2 or 3 years the populations were still markedly affected in many soils. *Trichoderma viride* was stimulated by fumigation treatment much more often than other species. [From authors' abstract.]

Citrus—fruit harvesting, storage and composition.

(*See also* 2023, 2773, 2778, 2827b, p, 2828j, q.)

2808. GRIERSON, W.
Reducing losses in harvesting and handling tangerines.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 165-70, bibl. 10.

Decay in tangerines picked with a good orange colour break was about half that in tangerines picked with little or no orange colour break. The final colour of fruits picked too green and degreened with ethylene was very poor. "Zebra skin", a distinctive form of peel injury, occurred in 3 pickings that were harvested 3–5 days after heavy rain.—Fla Citrus Exp. Stat., Lake Alfred.

2809. BERAHA, L., AND OTHERS.
Gamma radiation for possible control of post harvest diseases of lemons and oranges.
From abstr. in *Phytopathology*, 1957, **47**: 4.

Experiments with artificially inoculated lemons and oranges have indicated the possibility of control of *Penicillium digitatum* and *P. italicum* following irradiation between 2×10^5 rep and 1×10^5 rep. The nature of control apparently is not sterilization, since the irradiation dosages required for complete kill of the pathogen produce textural and skin-colour abnormalities of the fruits. Safe and effective dosages, which prolong the period lemons and oranges can be held without spoilage, either partially inactivate the pathogen or extend the latent period of infection. The length of holding without incidence of infection or visible radiation injury bears a direct relation to the dose received, to the temperature of storage, to the age of infection, to the nature of the suscept, and to the organism involved.

2810. Kefford, J. F.
Citrus and pineapple juices—influence of raw materials on quality.
Food Pres. Quart., 1956, **16**: 62-8, bibl. 59.

Information available on the effect of raw materials on the quality of the fruit juice is summarized under the headings: variety, rootstock, maturity, cultural practices and climatic factors for citrus, and variety, maturity, type of fruit, climatic factors and plant nutrition for pineapples.—C.S.I.R.O., Homebush, N.S.W. J.R.L.

2811. Deszyck, E. J., and Ting, S. V.
Seasonal changes in the juice content of pink and red grapefruit during 1955-56.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 68-72, bibl. 7, and *Citrus Ind.*, 1957, **38**(3): 5-8, bibl. 7.

Fruits of 3 sizes were collected during the season from 137 groves of pink seedless and Ruby red grapefruits on rough lemon and sour orange rootstocks, and the juice contents were determined. In general juice contents increased as the season advanced, increasing by about one-third from September to March. Towards the end of the season Ruby red fruit contained more juice than did pink seedless, and fruits on sour orange contained more juice than those on rough lemon.—Fla Citrus Exp. Stat., Lake Alfred.

Dates.

(*See also* 2827q, 2828d.)

2812. Péreau-Leroy, P.
Fécondation du palmier dattier. **(Flower fertilization in date palms.)**
Fruits d'Outre Mer, 1957, **12**: 101-5, bibl. 4, illus.

No instances of complete incompatibility were shown when 10 Moroccan varieties were pollinated with 75 lots of pollen of different origin, but for each pollen applied the percentage fruit set depended on the variety of the recipient palm. In the variety Jihel the female inflorescence was fully receptive for 4 days after the natural opening of the spathe, but practically non-receptive after the 8th day. In Bou Feggous and Mehjoul the receptive period was distinctly shorter. Removal of the spathe a few days prematurely, followed by pollination, gave good fruit set. Rain falling 10–12 hours before pollination reduced fruit set by 25–33%, but, if this period and the 4 hours following pollination were dry, there was no reduction. The best time of day for pollination was 10 a.m.–3 p.m. and the use of a duster was better than the traditional method dependent on wind. Certain types of pollen showed promise in accelerating fruit ripening, but that obtained from California for this purpose gave a low fruit set.—I.F.A.C.

2813. Péreau-Leroy, P.
Recherche d'un test de sensibilité des variétés de palmier-dattier à la fusariose. **(Attempts to establish a test for the susceptibility of date palms to *Fusarium* infection.)**
Fruits d'Outre Mer, 1957, **12**: 53-6, illus.

In the variety Bou Feggous, slowly developing necrosis resulted from placing culture material of *Fusarium oxysporum albedinis* in contact with roots, but Bou Stammi roots were not affected. Artificial infection of incisions produced more marked necrosis, but without consistent differences between varieties. After 6 months the diseased regions were distinctly isolated by the plant's reaction, except where the incisions were made near the point of origin of the root. Further investigations are to be made.

2814. Samish, Z.
Maturation and preservation of dates. [Hebrew.]
Hassadeh, 1957, **37**: 554-7, bibl. 12.

The physical and chemical changes which occur during the natural and artificial ripening of maturing dates are described. The Chiani variety does not ripen uniformly and different methods of artificial ripening have been compared. Best results were obtained when the detached bunches were immersed in weak solutions of acetic acid or in solutions containing 0·01% 2,4-D. While with untreated dates only between 10 to 30% of the fruits reached complete maturity, between 65 to 75% matured within 48 hours after treatment. Spraying the solutions on to the bunches was found to stimulate ripening to the same extent as immersion and appears to be more convenient for commercial purposes. The keeping quality of the ripe dates could be considerably prolonged by pasteurization. [From abstract provided by author.]

Litchis.

(*See also* 2827g.)

2815. Young, T. W.
Response of lychees to girdling.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 305-8, bibl. 5.

Several trials, involving 2 varieties, have shown that girdling of vigorous trees may succeed in inducing flowering without causing permanent injury to the treated branches. In general flowering and fruiting was heavier after September or October girdling than on non-girdled or November-girdled trees. With trees that had given high yields in the season before girdling yields were increased by girdling to a greater extent, in comparison with control branches, than in trees that had produced low yields before girdling.—Subtrop. Exp. Stat., Homestead, Fla.

Macadamias.

(*See also* 2828p.)

2816. Hamilton, R. A.
Problems in germinating macadamia seed.
Hawaii Fm Sci., 1957, **5**(3): 3, 9, 12.

Most of the seeds of the variety HAES 503 germinate within 2 weeks from planting, but seeds of other varieties may take much longer. Tests have shown that macadamia nuts planted without removing the husk will not germinate until the husks have rotted away. When shells are cracked before planting the majority of embryos rot rather than germinate. In a test with 4 varieties there was little loss in viability with husked air-dried seed after 4 months storage at ordinary room temperature. After 12 months' storage no seed of any variety germinated. The most satisfactory seeds for germination were those heavy enough to sink in water and having the embryo still attached to the inside of the shell.

Olives.

(*See also* 2092, 2691, 2827d, m, u, y, z, 2828a, f.)

2817. ARENA, M.
Studio del ritmo vegetativo di *Olea europaea* L. in Messina negli anni 1952-54. **(Study of the vegetative growth rhythm in *Olea europaea* in Messina, 1952-54.)** [English summary ⅓ p.]
Nuovo G. bot. ital., 1955 (issued 1956), **62**: 395-422, bibl. 8, illus.

In olive trees at Messina cambial activity begins in the trunk at or immediately after bud burst, about mid-March, reaching a maximum in April and then decreasing, but usually rising again in May or early June and falling, but not ceasing, during late summer. A further rise occurs in autumn, followed by complete rest from November until the following March. The summer rest, characteristic of more northerly olives, is lacking, but the summer xylem is anomalous, beginning with a parenchymatous band in which starch accumulates as soon as cambial activity is markedly reduced. Phloem is produced only during spring and autumn, at rates inversely proportional to xylem production. In 3–4 year old shoots there appears to be only a single annual xylem ring. Elongation of shoots usually begins in March and is most rapid in April, slowing to complete cessation in July. Where numerous buds are present there is no further lengthening until spring, otherwise a brief period occurs at the end of summer. The cambium can only be active while both temperatures and the tree's water balance are sufficiently high. In spring the length of unsuberized shoot remains fairly constant, but in autumn the cork forms simultaneously throughout the youngest portion.

2818. CIAMPI, C.
Ritmo dell'accrescimento vegetativo in *Olea europaea* L. nel clima di Firenze. **(Rhythm of vegetative growth in *Olea europaea* in the climate of Florence.)** [English summary ¼ p.]
Nuovo G. bot. ital., 1955 (issued 1956), **62**: 428-36, bibl. 2.

In Florence and Camerino cambial activity in wood production was completely suspended in winter, steadily continuous in spring and summer and intermittent in autumn after a brief resting period. The more typical sequence found in Bari was winter rest, intermittent activity in spring and early summer, definite quiescence from July to September and sporadic activity in October.

2819. MORETTINI, A.
La potatura dell'olivo secondo un esperienza quindicinale. **(The pruning of olives in accordance with a fifteen-year experiment.)**
Ital. agric., 1955, **92**: 573-90, illus. [received 1957].

Systems of pruning for shape and production are discussed. In an experiment near Florence with the varieties Moraiolo and Frantoio, trees left unpruned for 15 years gave much higher total yields than those pruned annually, but fruit size and quality were inferior, harvesting was more costly and the congested growth tended to attract pests. For re-crowning old trees the method of decapitation is being replaced by that of retaining 3 main branches and training them to form a truncated cone.

2820. MORETTINI, A.
Ricostituzione dell'olivo. **(Regeneration of olive trees.)**
Inf. fitopat., 1957, **7**: 34-7, illus.

In frost-damaged trees the dead wood should be cut out. If this involves removal of main branches, shoots from their stumps should be allowed to remain for a year before thinning. Seriously damaged trunks should be removed and numerous suckers allowed to develop by exposing the uppermost ovuli. These suckers should be thinned in the second, and reduced to 3 in the third, year, forming the new crown which becomes productive 4–6 years after removal of the trunk. In most instances where replanting is necessary, the risk of frost damage to varieties giving high yields of good quality oil is preferable to reduction of yield and quality by introducing the shorter-lived, cold-resistant varieties such as Morchiaio and Leccino. In regenerating trees supplementary nitrogen and increased protection from fungi and pests are necessary.

2821. RUI, D., AND OTHERS.
Ulteriori indagini sulla leptonecrosi da borocarenza dell'olivo. **(Further investigations on leptonecrosis due to boron deficiency in olives.)**
Not. Mal. Piante, 1957, **39**: 59-63, bibl. 2.

The beneficial effects of adding 17·5 g. of boric acid per tree to the NPK fertilizer lasted for 3 years in young trees. In trees aged 40 years or more the symptoms were cured by 190 g. of boric acid per tree but reappeared after 2 years. Fruit set and yield improved in the year of B application and more markedly in the following year. Leptonecrosis was cured in one group of trees by soil injections in April of a 5% solution of 13–13–20 fertilizer.

2822. SCRIVANI, P., AND BUGIANI, A.
Messa a punto di un metodo per la riproduzione artificiale della rogna dell'olivo e risultati dei primi saggi terapeutici a mezzo di sostanze antibiotiche. **(Perfection of a method of artificial transmission of olive tuberculosis and results of preliminary control trials with antibiotics.)** [French, English and German summaries 6 lines each.]
Ital. agric., 1955, **92**: 361-9, bibl. 34, illus. [received 1957].

The disease was transmitted by introducing cultured

Pseudomonas savastonoi 3–4 mm. deep into young shoots by pricking with steel pins, whereas introduction into incisions and under bark was unsuccessful. Tubercle growth was checked by streptomycin. *In vitro* tests showed inhibitions in decreasing order with Terramycin, streptomycin, and chloramphenicol, while penicillin and Actidione were completely ineffective.

2823. Russo, G., and Santoro, R.
Esperimenti di lotta antidacica eseguiti in Ascea (Salerno) nel 1954. **(Experiments in olive fly control carried out in Ascea (Salerno) in 1954.)** [English summary ¾ p.]
Ann. Sper. agrar., 1957, **11**: 65-114.

Of various insecticides and mixtures tested, parathion gave the best results. The control was greatest with 0·1% emulsifiable parathion, but reduction to 0·075 or 0·05% in order to minimize toxic residues did not seriously affect the action. Addition of a sticker was an advantage. Parathion killed eggs and larvae as well as adult flies. Its action was intensified by the addition of copper fungicides. Good control was also given by a 50%-active 9 : 1 mixture of DDT and parathion. After 2 autumn treatments of trees with 0·05% parathion the oil extracted did not contain more than 3 p.p.m. of residue.

Passion fruit.

2824. Romero Castañeda, R.
Plantas de valor comercial del genero *Passiflora*: granadilla, curuba, badea y otras. **(Commercially valuable plants of the genus *Passiflora*.)**
Agric. trop. Bogotá, 1956, **12**: 403-7, bibl. 4, illus.

The edible-fruited species growing in Colombia are *P. vitifolia*, *P. nitida*, *P. maliformis*, *P. mollissima*, *P. ligularis*, *P. cumbalensis* and *P. quadrangularis*. Characteristics and altitude range are given for each, together with fruit composition of 3 species. It is proposed to make a detailed study of the genus at Palmira.

Tung.

2825. Neff, M. S., Drosdoff, M., and Barrows, H. L.
Effect of time of applying fertilizers on growth of newly planted Lampton tung trees on Lakeland fine sand.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 204-10, bibl. 1.

Results of trials in 1952, '53 and '54 were somewhat inconclusive except as showing that the response of tung to time of application of fertilizer varies from year to year.—U.S.D.A., Cairo, Ga, and Gainesville, Fla.

2826. Drosdoff, M., and others.
Toxic effects of urea fertilizer on mature tung trees.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 201-3, bibl. 5, illus.

Leaf toxicity symptoms were noticeable in a mature tung orchard after 5 years' application to the soil of urea fertilizers. They varied in intensity with variety and were less when high potassium treatment was also given. The severity of toxicity on some of the urea-treated trees caused premature defoliation, and it is thought that eventually yield may be affected.—U.S.D.A., Gainesville, Fla.

Noted.

2827.

a Agricultural Research Service, U.S. Department of Agriculture.
The Mediterranean fruit fly: methods of eradication.
[*Publ.*] *U.S. Dep. Agric.* **PA301**, 1956, pp. 8, illus.
Second appearance in Florida in 1956 and eradication programme.

b Andrade, A. C.
Observações sôbre as laranjas brasileiras no mercado inglês. **(Observations on Brazilian oranges in the English market.)**
Biológico, 1956, **22**: 187-93, bibl. 5.
Proposals on improved packing, use of preservatives and artificial colouring.

c Carpena, O., and others.
Composición química de hojas de citrus. 1. Limonero. **(Chemical composition of citrus leaves. 1. Lemon.)** [English summary ¼ p.]
An. Edafol. Fisiol. veg., 1957, **16**: 59-75, bibl. 70.
Technique of sampling and analysis; results for N, P, K, Ca, Mg, Fe and Mn.

d Castorina, S.
Estrazione dell'olio dalle olive per mezzo dell'ellettroforesi. 1. Comunicazione: Il principio elettroforetico di estrazione dell' olio dalle olive. **(Extraction of oil from olives by electrophoresis. Part 1. The electrophoretic principle of extraction of the oil.)**
Olearia, 1956, **10**: 79-82, bibl. 3, illus., French translation in *Oléagineux*, 1956, **11**: 781-4, bibl. 3, illus.

e Chavanier, G.
L'avocatier. **(The avocado.)**
Fruits et Prim., 1957, **27**: 3-8, illus.
Varieties, cultural requirements, marketing, and prospects in Morocco.

f Childs, J. F. L.
A new disease of citrus trees in Florida.
From abstr. in *Phytopathology*, 1957, **47**: 6.
An organism, possibly a basidiomycete, attacking roots of several species.

g Cobin, M.
The lychee in Florida.
Bull. Fla agric. Exp. Stats **546**, 1954, pp. 35, bibl. 26, illus. [received 1957].
A revision of *Bull.* 471 by R. B. Ledin; all cultural aspects covered.

h Costantino, G.
Citrus bud mite in Italy.
FAO Plant Prot. Bull., 1956, **5**: 45-6, bibl. 6.
Aceria sheldoni; work on damage and control reviewed.

i VAN DINTHER, J. B. M.
Scale insects of citrus in Suriname.
Reprinted from *Ent. Ber.*, 1957, **17**: 13-18, bibl. 7, illus., as *Bull. LandbProefst. Suriname* **72**, 1957.
Descriptions of 6 species; no control measures.

j EVRÉINOFF, V. A.
Étude pomologique sur le feijoa. **(A pomological study of the feijoa.)**
Fruits et Prim., 1957, **27**: 9-12, bibl. 15.
Biology, cultural requirements, propagation and varieties.

k FEDER, W. A., AND FELDMESSER, J.
Starting and maintaining burrowing nematode-infected citrus under greenhouse conditions.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 29-30, illus.
For chemical screening tests, etc.

l GERARDI, L.
American persimmon varieties and their desirability.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 132-6.
Notes on 42 varieties.

m GRAMOLINI, M.
Gli olivi dopo un anno dall'eccezionale freddo. **(Condition of olive trees a year after exceptional cold.)**
Ital. agric., 1957, **94**: 248-55, illus.
Severely damaged trees recovered best following drastic pruning.

n HARDING, R. B.
California citrus soils.
Calif. Citrogr., 1957, **42**: 192, 209-12.
Physical and chemical characteristics of main soil types described briefly.

o JOHNSTON, J. C.
Citrus fruit for the home orchard.
Circ. Calif. agric. Exp. Stat. Ext. Serv. **409**, revised 1956, pp. 15, illus.

p KLOTZ, L. J.
Control of decay of citrus fruits in cartons.
Citrus Leaves, 1957, **37**(4): 6-7.
Outline of problems and of research on use of ammonium compounds.

q KLOTZ, L. J.
Controlling diseases of citrus and subtropicals.
Calif. Citrogr., 1957, **42**: 220-2, bibl. 5.
Notes and spray programmes for citrus, dates and avocadoes.

r KNORR, L. C.
Re-appraising citrus rootstocks, with special reference to their susceptibility to virus diseases. I. Trifoliate orange (*Poncirus trifoliata* (L.) Raf.).
Citrus Mag., 1957, **19**(8): 12, 14-15, 18, 22-3, bibl. 16, illus.
Its many virtues and one serious defect, susceptibility to exocortis.

s KNORR, L. C., AND PRICE, W. C.
Is stem pitting of grapefruit a threat to the Florida grower?
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 65-8, bibl. 20.
Relation of stem pitting to tristeza discussed.

t KRISHNAMURTHI, S.
A note on the occurrence of a seedless double-fruited rough lemon.
Indian J. Hort., 1956, **13**: 212-13, bibl. 1, illus.
With the smaller set of carpels at the stem end.

u LASSANDRO PEPE, T., AND STORACE, G.
La estrazione totale del parathion dell'olio d'oliva e sua determinazione. **(Total extraction of parathion from olive oil and its determination.)**
Olearia, 1956, **10**: 9-11, bibl. 5, illus.

v LEWIS, H. C.
Citrus mite problem in Calif.-Arizona.
Calif. Citrogr., 1957, **42**: 232, 240-4, illus.
Types and control measures in use against them.

w MCDANIEL, J. C.
Persimmon evaluation—further notes.
47th A.R. north. Nut Grs' Ass. 1956, New Haven, Conn., pp. 136-8.
On varieties.

x MANEFIELD, T.
Control of common pests of citrus in coastal areas of southern Queensland.
Qd agric. J., 1956, **82**: 687-92, illus.
A spray programme.

y MORETTINI, A.
La ricostituzione in Francia degli oliveti colpiti dal gelo. **(Reconstitution of olive groves in France damaged by frost.)**
Ital. agric., 1957, **94**: 11-20, illus.
Damage and rehabilitation in France and Italy compared. [See also *H.A.*, 27: 824.]

z MORETTINI, A., AND MASSACESI, A.
Il Leccio del Corno—razza di olivo molto resistente alle basse temperature ed al *Cycloconium*. **(Leccio del Corno—an olive variety very resistant to low temperatures and to *Cycloconium*.)**
Ital. agric., 1952, **89**: 299-304, illus. [received 1957].

2828.

a OPITZ, K. W.
Olive production and the table olive industry in Spain.
For. Agric. Rep. U.S. Dep. Agric. **92**, 1956, pp. 20, illus.
Acreages, varieties, cultural practices, pests and diseases and research.

b OPITZ, K. W.
Rootstocks for oranges in central California.
Calif. Citrogr., 1957, **42**: 174-8.
Reviewing orange rootstocks in central California groves.
Citrus Leaves, 1957, **37**(3): 6-7.
Observations on performance of Cleopatra mandarin, Troyer citrange, trifoliata, sweet orange and rough lemon.

c PATRON, A., AND MICHEL, F.
Essai pratique d'utilisation totale des oranges. (**Practical experiment on total utilization of oranges.**)
Fruits d'Outre Mer, 1957, **12**: 57-8, bibl. 3.
All parts except seeds and membranes were utilized.

d PÉREAU-LEROY, P.
Formation et malformation des rejets de palmier-dattier. (**The formation and malformation of suckers from the date palm.**)
Fruits d'Outre Mer, 1957, **12**: 17-19, illus.
Types, their removal and use for propagation.

e RACITI, G.
La qualità delle acque d'irrigazione in agrumicoltura. (**The quality of irrigation water in citrus growing.**)
Riv. Agrum., 1956, **1**: 471-8, illus.
Data from California and Sicily on Cl, Na and B.

f DE LA ROCHA G., G.
Ensayo de diversos tratamientos en la semilla de olivo. (**Experiments on various treatments for olive seed.**)
Bol. trim. Exp. agropec. P.C.E.A., Lima, 1956, **5**(2): 15-17.
See *H.A.*, 27: 1855.

g RODNEY, D. R., AND OTHERS.
Relation of chemical composition of leaves and roots to decline and collapse of California lemon trees.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 234-44, bibl. 17.
For a preliminary account see *H.A.*, 26: 4070.

h SAMSON, J. A.
Een vernevelprogramma voor de citruscultuur. (**A low volume spray programme for citrus trees.**) [English summary ¼ p.]
Surinaam. Landb., 1956, **4**: 226-8.
For use in Surinam.

i SERPA, D.
Los citricos. (**Citrus trees.**)
Agric. venezol., 1956, **21**(191): 20-1, illus.
Brief notes on deficiencies of B, Cu and Zn and their cure.

j STANLEY, W. L., VANNIER, S. H., AND GENTILI, B.
A modified method for the quantitative estimation of diphenyl in citrus fruits.
J. Ass. off. agric. Chem. Wash., 1957, **40**: 282-6, bibl. 2, illus.
A modification of the chromatostrip method [*H.A.*, 25: 961].

k ŠUMAKOVA, A. A., AND GRUBE, A. M.
The role of *Epicoccum granulatum* in mal secco disease of citrus. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(3): 33-9, illus.
Complementary to *Deuterophoma tracheiphila.*

l SUTTON, N. E.
Some observations on lime and avocado grove cultural and maintenance practices in Dade County.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 274-5.

m TARJAN, A. C., AND FORD, H. W.
A modified aceto-osmium staining method for demonstration of nematodes in citrus root tissues.
From abstr. in *Phytopathology*, 1957, **47**: 34.

n THOR, E., AND DOHNER, L. D.
Cost of moving citrus from tree onto highway trucks as related to methods of handling.
Bull. Fla agric. Exp. Stats **547**, 1954, pp. 44, illus. [received 1957].
Detailed comparison of 5 large-scale methods.

o VARMA, T. N. S., AND RAMAKRISHNAN, C. V.
Paper chromatographic technique to detect organic acids in citrus plant tissues (*Citrus acida*).
Curr. Sci., 1956, **25**: 395-6, bibl. 10.
With data for flowers, leaves, stems and roots.

p VOGEL, R.
Quelques observations sur la floraison de *Macadamia ternifolia* (noix de Queensland). (**Some observations on the flowering of the Queensland nut, *Macadamia ternifolia*.**)
Fruits d'Outre Mer, 1957, **12**: 50-2, illus.
Opening of flower buds described; self pollination is probable.

q WENZEL, F. W., AND MOORE, E. L.
Increased utilization of grapefruit through improvement in quality of processed products.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 79-87, bibl. 28.
About 48% of the 1955–56 Florida grapefruit crop was processed.

r ZANOTTI, L.
Arancio Ovale. (**The Ovale orange.**)
Ital. agric., 1952, **89**: 325-31, illus. [received 1957].
The seedless Ovale orange and its degenerate seeded form compared.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3024j.)

2829. Massal, E., and Barrau, J.
Food plants of the South Sea islands.
Tech. Pap. S. Pacific Commiss. **94**, 1956, pp. 51, bibl. 72, illus.

Among the crops described and liberally illustrated in this account of the staple and supplementary food plants of the South Sea islanders are sago [see also *H.A.*, 26: 3191t], polynesian arrowroot, yams, bananas, breadfruit and, very briefly, a large number of fruits.
J.R.L.

2830. U.S. Department of Agriculture, Foreign Agricultural Service.
The agricultural economy of Ethiopia.
Foreign Agric. Circ. **FAS-M-13**, 1956, pp. 44, bibl. 6.

This first readily available account of present-day Ethiopian agriculture makes interesting reading. Much the most valuable export crop is coffee and the government is doing much to foster its cultivation, preparation and export on economic lines. While there are many distinctive types, all belong to *C. arabica*, being classified in 2 categories as Abyssinian and as Harari coffee. The bulk of the crop is harvested from coffee forests, which are thought to be actually growths of wild coffee trees combined with abandoned plantations which have reverted to secondary forests. Other crops of horticultural or plantation interest on a very much smaller scale include sugar cane, fibre plants including sisal and "koba" or the false banana, tobacco, and many spices such as cayenne pepper, ginger, cardamom, caraway, sage, tamarind, saffron, mustard and thyme. Small amounts of good quality tea are grown. A small export exists of "much chat" (*Catha edulis*) also known as khat, cat, qat, or ghat, which is a substitute for tea or coffee among the Amhara tribes. Its leaves are mildly narcotic.

2831. Landrau, P., Jr., and Samuels, G.
Results of lime and minor-element fertilizer research in Puerto Rico, 1949-50.
J. Agric. Univ. P.R., 1956, **40**: 224-34, bibl. 17.

The results of replicated experiments on a number of crops are discussed briefly. The crops included: *Sugar cane:* Ca produced significant increases in sugar yields, but only on soils with a pH below 6. Variable but occasionally positive, responses were obtained from applications of B, Cu, Fe, Mg, Mn and Zn. No benefit resulted from the application of Na or S. *Acerola* (*Malpighia punicifolia*)*:* On a sandy-clay soil of pH 4·5 lime increased yield by over 400%. *Pineapple:* Fe sprays and a frit containing several minor elements increased yields. *Tobacco:* Ca increased yields, but B and Mg did not. *Tomato:* Mg and B decreased yields on a clay soil. *Grapefruit:* Spray and soil applications of Zn and Mg sulphates corrected deficiency symptoms.

2832. Léonard, J.
Un nouveau *Croton* congolais utilisé comme arbre d'ombrage: *Croton haumanianus* J. Léonard (*Euphorbiaceae*). **(A new *Croton* of the Congo region, *C. haumanianus* (*Euphorbiaceae*) used as a shade tree.** [Flemish summary ⅔ p.]
Bull. agric. Congo belge, 1957, **48**: 77-85, illus.

The new species, which is fully described, was formerly confused with *Croton mubango* and *C. mayumbensis*. It is an excellent shade tree for coffee and cacao.

2833. Mes, M. G., von Hausen, S. S., and van Gylswyk, N. O.
A comparative study of the growth and yield of a number of *Crotalaria* species suitable for green-manuring.
S. Afr. J. Sci., 1957, **53**: 181-5, bibl. 1, illus.

A comparative study has been made of the growth characteristics of 9 *Crotalaria* species. *C. intermedia* was found to be potentially capable of giving a substantially higher yield than *C. juncea.* It has a longer growth period, more lateral branches, more and bigger leaves and more seeds than *C. juncea.* It was also palatable and is non-toxic. A disadvantage of *C. intermedia* is that at first it grows more slowly than *juncea. C. recta*, a perennial which was not killed completely by frost, gave a higher yield of dry matter in its second growth season than any of the other *Crotalaria* species in their first. It was palatable and when it was cut down the new shoots grew rapidly. Other promising species capable of giving yields at least equal to *C. juncea* were *C. mucronata*, *C. paulina* and *C. spectabilis*. The latter, however, is toxic and its seeds possess a hard testa. *C. juncea*, *C. intermedia* and *C. mucronata* were the only species whose seeds germinated satisfactorily without scarification. Because a great variation seems to exist within most species, it is suggested that much could still be done by breeding and selection to obtain improved strains. [From authors' abstract.]—Plant physiol. Res. Inst., Univ. Pretoria.

2834. Mes, M. G., von Hausen, S. S., and van Gylswyk, N. O.
A comparative study of the nitrogen content of a number of *Crotalaria* species suitable for green-manuring.
S. Afr. J. Sci., 1957, **53**: 185-9, bibl. 4.

A study was made of the percentage N and the total N content of various organs and of whole plants of different ages of *Crotalaria incana*, *C. intermedia*, *C. juncea*, *C. laburnifolia*, *C. mucronata* (*=striata*), *C. paulina*, *C. recta*, *C. spectabilis* and *C. usaramoensis*. The percentage N of the stems and branches increased towards the tips; in lateral branches and leaves it increased with height on the main stem. The percentage N was lowest in whole roots, stems, petioles and pods (minus seeds). With the development of the pods N appeared to be withdrawn mainly from the stems and to a lesser extent from the lower leaves. The total

N content of whole plants was dependent on the yield in dry weight, the percentage N in the various organs and the ratio of leaves and pods to stems. A maximum amount of 7 g. N per plant was found in *C. recta* and *C. intermedia.* Plants of *C. juncea*, *C. mucronata*, *C. paulina* and *C. spectabilis* were capable of yielding up to nearly 3 g. N per plant; the other three species contained less. [From authors' abstract.]—Plant physiol. Res. Inst., Univ. Pretoria.

Bananas.

(*See also* 2282, 2640, 2829, 2993e, n, z, 3021.)

2835. Nayar, T. G., Sundararaj, J. S., and Seshadri, V. S.
Nanguneri Peyan variety of banana—its culture and taxonomical status.
Indian J. Hort., 1957, **14**: 24-9, bibl. 3.

The culture and taxonomy are described of the Nanguneri Peyan banana, which is widely cultivated in the south of Madras State. It is recommended that the variety should be included in the *balbisiana* section. —Centr. Banana Res. Stat., Aduthurai, Madras.

2836. Bhan, K. C., and Mazumder, P. K.
Propagation trials on banana. II. Butts and bits of rhizomes as planting materials.
Indian J. Hort., 1956, **13**: 141-8, bibl. 7.

In a replicated trial at Krishnagar, butts from fruited and non-fruited plants of the Beula banana were planted either whole or cut into 2 or 4 equal bits, each possessing at least 1 well developed bud. At first the best growth was made by whole buts of fruited plants, followed closely by buts of non-fruited plants. Quarter bits of non-fruited plants were slowest to grow. Ultimately, however, growth and number of hands per bunch were not affected by type of planting material. —Banana Res. Stat., Chinsura, W. Bengal.

2837. Hasselo, H. N.
Earthing-up of Gros Michel bananas.
Trop. Agriculture Trin., 1957, **34**: 59-64, bibl. 2, illus.

Results of an experiment during 1955–56 showed that losses by wind due to broken stems and uprooted plants were reduced by 30–50%, if the bases of the banana plants were earthed-up instead of being exposed in the normal way. Erosion was restricted by not ramming down the soil of the mounds and by placing trash around them.—Cameroons Dev. Corp., Ekona, Brit. Cameroons. J.R.L.

2838. Nayar, T. G., Seshadri, V. S., and Bakthavathsalu, C. M.
A note on mattocking practices in banana culture.
Indian J. Hort., 1956, **13**: 210-11, bibl. 1.

Three treatments were given to the Monthan banana variety immediately after harvesting the plant crop: (1) parent pseudostem left untouched; (2) parent pseudostem cut back to half its length (3) parent pseudostem cut back to ground level. Yield per bunch of the ratoon crop was significantly higher after the first 2 treatments than after the third. Differences between the first 2 treatments were not appreciable.—Centr. Banana Res. Stat., Aduthurai, Madras St.

Cacao.

(*See also* 2659, 2832, 2993a, i, 2995h, p, 3021.)

2839. West African Cocoa Research Institute (W.A.C.R.I.).
Annual Report West African Cocoa Research Institute, 1955-56, Tafo, 1957, pp. 90, 5s.

Reports on the following subjects are given: *Virus research:* host range of cacao viruses, insect transmission, classification of virus isolates, mechanical transmission, chemical detection of cacao virus infection, progeny testing for resistance and tolerance. *Mealybug studies:* movement of mealybugs in and between cacao trees, effect of wind currents on vector dispersal, and mass-breeding of mealybugs. *Black-pod disease:* spraying and harvesting trials, and cushion infection. *Capsid studies:* efficiency and mode of action of insecticides, efficiency of fog application of BHC, combined cultural and insecticidal control of capsids, population studies, and fungi associated with capsid lesions. *Experiments on establishment and maintenance:* establishment, spacing and other trials. *Soil fertility, shade, and manurial requirements:* effect of major nutrients on cacao, minor element deficiencies, effect of day length and fertilizer treatment on growth of cacao seedlings, and the effect of organic and inorganic mulches in relation to shade and fertilizer treatment. *Root studies:* growth of cacao seedlings on 2 contrasting soils and in association with other plants. *Vegetative propagation:* simplified techniques for rooting cuttings. *Plant breeding and selection:* progeny and introduction trials at Tafo, growth and yield trials at other sites, natural pollination, incompatibility, and polyploids. *Physiology of fruiting:* factors influencing yield, cherelle wilt, effect of over-bearing in the early years on subsequent yield, cushion and flower formation. *Cocoa preparation and quality:* chemistry and fermentation methods. *Insecticide and fungicide studies:* as affecting pollination. *Ibadan Sub-station:* virus research, mealybug and capsid studies, and minor insect pests of cacao.

2840. Malaya Department of Agriculture.
Notes on current investigations (research) January to March, 1956. Cacao.
Malay. agric. J., 1956, **39**: 141-3.

In tests comparing foliage applications of several insecticides against *Apogonia* the best results were obtained with lead arsenate at 0·4% or a 25% DDT miscible liquid at 0·08%. Cacao seedlings growing in sand culture without Ca have shown severe stunting and defoliation, and similar but less severe symptoms were induced by Mg deficiency. K deficiency induced severe marginal leaf scorch but did not seriously affect growth.

2841. Cornwell, P. B.
A preliminary investigation into the uptake and translocation of phosphorus-32 in *Theobroma cacao* L.
Trop. Agriculture Trin., 1957, **34**: 117-32, bibl. 13, illus.

Phosphorus-32 was introduced into cacao trees by trunk implantation, the immersion of roots and application to the soil. Radioactive assay showed that the distribution of activity in the trunk and branches was influenced by the location of the holes of implantation and of the roots engaged in absorbing the active material. There was little lateral movement in the conducting vessels of the trunk, so that only those branches which originated near the path of translocation took up P^{32}. It would appear that the most uniform distribution of activity in the trees is obtained after application to the soil. The distributions and levels of activity in the branches are considered in relation to the suitability of these techniques for labelling the mealybug vectors of cacao viruses at their feeding sites in the field. Considerably higher levels of activity than those employed in the present work are required in the branches before such insects can be used in ecological studies. The results are of further interest in relation to other fields of cacao research, involving the application of systemic insecticides, the uptake of nutrients and the effect of shade. [Author's summary.]—W.A.C.R.I.

2842. VIADO, G. B., AND OTHERS.
Six combination sprays in the control of insect pests and diseases of cacao.
Philipp. Agric., 1956, **40**: 129-34, bibl. 7.

Insecticide-fungicide combinations of DDT, Dithane Z-78, dieldrin, EPN, toxaphene, bordeaux and Orthocide 50 were used in pest and disease control experiments. All treatments except toxaphene+Dithane Z-78 gave good control of the pod borer, *Pachyrrhynchus moniliferus*. Control of *Helopeltis bakeri* was obtained with all treatments, Dithane Z-78 with EPN or toxaphene giving the best results. No significant differences were found in disease control between the combinations tested. DDT+Dithane Z-78 and EPN +Dithane Z-78 appeared promising against black rot (*Phytophthora palmivora*). Dithane Z-78 combined with DDT, dieldrin or EPN was very effective against charcoal pod rot (*Botryodiplodia theobromae*).

2843. DESROSIERS, R.
Diferenciación entre variedades de cacao con base a su susceptibilidad a la infección con *Ceratostomella fimbriata*) (E. and H.) Elliot, en El Ecuador. (**Differentiation between cacao varieties in Ecuador on the basis of their susceptibility to infection by *Ceratostomella fimbriata*.**) [English abstract 10 lines.]
Turrialba, 1956, **6**: 48-52, bibl. 3, illus.

Indications of a strong relationship between susceptibility to *Ceratostomella* disease of cacao and the Criollo variety of cacao is suggested from observations of the relative susceptibility of Criollo, Forastero and Trinitario cacao at the Tropical Experiment Station in Ecuador. In an area planted to a collection of cacao varieties, 54% of the plants displaying a predominance of Criollo characteristics were infected or had died of the disease, whereas only 2·5% of other types were infected and none was dead. It is suggested that large plantings of Criollo cacao are likely to suffer severely from this disease, whereas in plantings of Trinitario cacao, which combined germ plasm of Criollo and Forastero, only those segregates having predominance of Criollo germ plasm are likely to be susceptible. [Author's abstract].

2844. KOENRAADT, J.
Chemische bestrijding van de larven van de cacaotor. (**Chemical control of *Steirastoma* larvae.**) [English summary ¾ p.]
Surinaam. Landb., 1956, **4**: 197-201.

The method of control recommended by van Dinther [*H.A.*, 27: 859] has proved to be rather expensive, and costs were reduced by applying the insecticide to the branches only, using a paint brush. Another effective method, which was even less expensive, was to paint the spots where larvae had been detected with 2% dieldrin in oil.

2845. HOWAT, G. R., POWELL, B. D., AND WOOD, G. A. R.
Experiments on cocoa fermentation in West Africa.
J. Sci. Food Agric., 1957, **8**: 65-72, bibl. 2, illus.

A series of experiments on cacao fermentation using heaps, boxes and steel vessels has been carried out in the Gold Coast and Ashanti. Successful 6-day fermentations were carried out in a box using from 200 to 700 lb. of wet beans and turning after 2 days and after 4 days; this method is preferable to heap fermentation in new cacao-growing districts. A small stainless-steel vessel designed to ferment beans from 150 to 500 pods was also tested and found satisfactory. Beans from pods harvested a week before breaking were successfully fermented without modification of the 'standard' box method. Transport of wet beans, and delays of up to 24 hours before the beginning of fermentation produced no adverse effects on fermented beans. The recovery of Amazonian beans was significantly less than that of Amelonado beans.—Cadbury Bros., Bournville.

2846. DE VOS, L.
Artificial drying of cocoa.
Bull. LandbProefst. Suriname **73**, 1956, pp. 27, bibl. 14, illus.

In experiments carried out to find a method of drying cacao artificially it was found that when fermented and washed beans were pre-dried in a rotary wire gauze dryer at an air temperature of 90° C. and then finally dried on a tray in a tunnel dryer at an air temperature of 70° C. the quality was equal to that of sun-dried beans. Similar results were obtained when beans were sun-dried for some hours and then finally dried as above at 70° C. Descriptions and diagrams of the rotary and tunnel dryers are given together with the estimated cost of artificial drying. J.R.L.

Cloves.

2847. FERRARA, A.
Tecnologia delle spezie. (**Spice technology.**)
Riv. Agric. subtrop., 1957, **51**: 19-35, illus.

This is the first of a series of articles on the different species classified according to whether they are derived from flowers, fruits, seeds, bark or rhizomes. Cloves are dealt with on this occasion. Except for a note on the chief producing areas no mention is made of the problems of clove tree cultivation, but very exact descriptions are given of the clove itself, its harvesting and curing. The characters of the final product are considered in detail and the chemical composition of its oil. General and special uses and sharp practices in the trade are also discussed.

2848. HADIWIDJAJA, T.
"Matibudjang" disease of the clove tree (*Eugenia aromatica* Baill.). [Indonesian summary 2 pp.]
Contr. gen. agric. Res. Stat. Bogor **143**, 1956, pp. 74, bibl. 35, illus.

Matibudjang disease has in the past killed tens of thousands of clove trees in Java. It commonly attacks trees in the 1st to 3rd year of fruiting and the infected trees die within 2–3 years. Although matibudjang disease appears to resemble the sudden-death disease of Zanzibar closely, it would be premature to regard the two as identical. Earlier workers have advanced a variety of theories as to its cause, and these, together with the author's own investigations are discussed in detail. The conclusion is reached that it is due primarily to: (1) Poor physical soil conditions, notably a clay pan, poor drainage or high water table; (2) physiological upsets caused by cropping, and perhaps overbearing, which in turn are associated with climatic factors; and (3) cultural neglect and the damage done to aerial parts of the trees by other diseases and pests. Suggestions are made on the choice of soils and climatic regions for planting new areas of cloves and for improved cultural and manurial practices. In addition there is some evidence that the "Kotok" type of clove is more resistant to the disease than the "Putih" type, as well as being potentially more productive.

Coconuts.

(*See also* 2659, 2890, 2993r, 2994f, k, n, s, 2995a, r, 3014, 3017, 3024a.)

2849. FRÉMOND, Y.
Recherches agronomiques de l'I.R.H.O. sur le cocotier. (**Agronomic research by the Institut de Recherches pour les Huiles et Oléagineux on the coconut.**) [English summary ¼ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 204-6.

Ivory coast palms responded markedly to K at 1·5 kg. of chloride per tree. Vegetative growth was better with cassava than with *Centrosema* as the associated crop. In Dahomey K-deficient palms responded poorly to similar treatment, but night soil or cotton waste gave good results. In French Togo old palms responded well to ammonium sulphate. Investigations on the possible cause of the 'unknown disease' are proceeding along several lines.

2850. GANGOLLY, S. R., AND GOPALAKRISHNAN, T. P.
Getting more coconuts per bunch.
Bull. Indian centr. Coconut Cttee, 1957, **10**: 167-70.

Button shedding in coconuts was much reduced by spraying the bunches just after fertilization, and 3 times thereafter at weekly intervals with 2,4-D or PCPA applied alone or together or mixed with coconut milk or cow's urine. In some cases yields of nuts and copra were doubled. The treatment recommended for trial in a 30 p.p.m. 2,4-D solution plus coconut water in equal quantities.

2851. KARTHA, A. R. S., AND NARAYANAN, R.
Development of oil in the ripening coconut.
Indian J. agric. Sci., 1956, **26**: 319-27, bibl. 25.

Oil contents and characteristics were studied in developing coconuts at monthly intervals from the 7th to the 13th month after flowering. The oil from the white kernel differed somewhat from the oil from the brown testa but possessed the same characteristics as ordinary coconut oil from the beginning to the end of the period. The oil content, measured as a percentage of dry weight of kernel, reached its maximum of about 68–70% by the beginning of the 9th month after flowering, when kernel and oil development had reached only about 33% of the values produced by mature nuts.—Indian agric. Res. Inst., New Delhi.

2852. SANKARASUBRAMONEY, H., PANDALAI, K. M., AND MENON, K. P. V.
Studies on soil conditions in relation to the 'root' and 'leaf' diseases of the coconut palm in Travancore-Cochin. Part III. Total available and exchangeable potassium contents of coconut soils.
Indian Coconut J., 1956, **9**: 90-100, bibl. 26.

Soil analyses have shown that the soils of healthy areas contain higher concentrations of K, and especially of available K, than the soils of diseased areas. The symptoms of palms affected by 'root' disease resemble those generally attributed to K deficiency. Further investigations are in progress. [For part II see *H.A.*, 27: 863.]

2853. SCHARPENSEEL, H. W., AND MENKE, K. H.
Über Tastversuche zur Frühdiagnose von virösen Pflanzenkrankheiten nach neuen Methoden. (**Tests for the early diagnosis of plant virus diseases.**) [English and French summaries ½ p. each.]
Landw. Forsch., 1957, **10**: 60-3, bibl. 9, illus.

Healthy and diseased tissues of coconut, manila hemp and potato were used in these studies. One method of diagnosis is based on differences in the colour and structure of sterile lyophilized press juices from virus-infected and healthy plants. A second method is based on virus haemaglutination.

2854. SIMMONDS, F. J.
An investigation of the possibilities of biological control of *Melittomma insulare* Fairm. (Coleoptera, Lymexylonidae), a serious pest of coconut in the Seychelles.
Bull. ent. Res., 1956, **47**: 685-702, bibl. 44, illus.

The damage caused by *Melittomma* larvae is described, and the literature relating to the distribution of other lymexylonids is reviewed. One of these, *Atractocerus brasiliensiis*, was investigated in detail in Trinidad, but no natural enemy was found. The evidence suggests that biological control of *M. insulare* will only prove possible, if it is found that *Rhizophagus dispar*, recorded as attacking the lymexylonid *Hylecoetus dermestoides* in England, will also attack the eggs of *M. insulare*.—Commonw. Inst. biol. Control.

2855. Vestal, E. F.
Control of coconut beetles and weevils in Thailand.
FAO Plant Prot. Bull. ,1956, **5**: 37-44, illus.

An account is given of the serious damage caused by these pests in Thailand and of the official measures being taken to control them. The rhinoceros beetle (*Oryctes rhinoceros*) causes wounds through which the red palm weevils (*Rhynchophorus* spp.) may enter. It may be controlled by treatment of its breeding places (dead coconut palms or densely packed, moist plant material) with aldrin, dieldrin or heptachlor. Palms infested with *Rhynchophorus ferrugineus* and *R. schach* must be cut down and the infested portion burnt. Preliminary trials have indicated that effective protection from the weevils may be given to young palms by spraying them with 0·1% dieldrin at 3-month intervals.—U.S. Operations Mission to Thailand, Bangkok.

2856. Anon.
Red palm weevil.
Bull. Indian centr. Coconut Cttee, 1956, **10**: 77, 81.

Adult palms attacked by larvae of *Rhynchophorus ferrugineus* can be saved by injecting into the infested area of the trunk 1,000–1,500 c.c. of 1% Pyrocone E (pyrethrins-piperonyl butoxide). The application of 5% BHC or chlordane dusts to the axils of young palms may help to prevent attack.

Coffee.

(*See also* 2830, 2832, 2993j, 2994i, j, l, o, q, v, 2995j, k, q.)

2857. Tanganyika (Sanders, F. R.).
Twenty-second Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, for the 1955/56 Season, pp. 34, Shs 2/50.

Improvement of planting material. In the clonal selection trials selections of the Kent variety have continued to give high yields. In comparative trials with progeny of 3 high-yielding selections clonal progeny again out-yielded seedling progeny. *Improvement of growing conditions.* Mulching has considerably increased yields in a mulch/irrigation trial. In a trial comparing guinea grass, elephant grass and banana trash mulches with compost, no significant differences in yield have yet occurred. In a plot with high *Albizzia* shade a banana intercrop reduced coffee yields. Over 18 years multiple stem trees have produced 22% more coffee than single stem trees. In an experiment comparing methods of establishing the single and multiple stem systems, the highest yields over a 3-year period have been obtained from trees with 3 suckers arising from below 10 inches on the mother stem. *Wound dressing trials.* R.C.O. bituminous paint was the most effective of 14 dressings tested against fungus attack. *Chemist's Report.* The K content in leaf and cherry was higher in trees receiving a banana mulch than in control trees. In one block there was higher K and lower Ca in the leaves of trees about to bear a heavy crop than in trees about to bear a light one. *Processing methods.* Tests with an American coffee washing machine showed that mucilage removal from freshly pulped coffee was possible without fermentation, but the machine had an adverse effect on quality of liquor. Chemical methods of removing mucilage are being tested.

2858. Lains e Silva, H.
Timor e a cultura do café. **(Timor and the coffee-growing industry.)** [English summary 10 pp.]
Mem. Ser. Agron. trop. Minist. Ultramar **1**, Lisbon, 1956, pp. 196, illus.

Coffee in Timor is planted under natural shade of *Albizzia moluccana* or *Casuarina* spp. Plenty of suitable land exists for extending the cultivation of robusta and liberica, but arabica must be restricted to altitudes of 1,000–2,000 m. unless clones resistant to rust can be developed. On the basis of a survey, suggestions are made for setting up development areas, in which the distribution of planting stock and the dissemination of information to growers would be supplemented later by experimental work.

2859. Zelensky, V.
Un essai de café culture mécanisée en moyenne Côte d'Ivoire. **(A trial of mechanization in coffee growing in central districts of the Ivory Coast.)** [English and Spanish summaries 2 pp. each.]
Agron. trop., 1957, **12**: 7-66, bibl. 29, illus.

A scheme is in operation in the Ivory Coast for mechanizing coffee growing. The operations and costs of clearing, planting and plantation maintenance are described and discussed. The best planting material is 15- to 18-month-old plants or 9-month-old seedlings with 12–14 pairs of leaves. For cultural operations the author prefers a crawler tractor to a wheeled tractor. Inorganic fertilizers have not given satisfactory results. The plantain (*Musa paradisiaca*) was used as overhead shade. BHC spraying from the air has been effective for *Oecophylla* and *Zonocerus* control. Promising results have been obtained in the trial so far.

2860. Gude, C. J.
Resultaten van robustatoetsproeven op de onderneming Guning Gumitir en in de proeftuin Sumber Asin. **(Results of robusta trials on the Gunung Gumitir Estate and the Sumber Asin Experiment Station.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1957, **26**: 19-28.

Three replicated experiments (2 with legitimate seedlings and 1 with clones) were planted in 1939/1940 and harvested after the war. On the basis of available data 4 legitimate seedling families are recommended for large-scale planting, and 3 clones are recommended for trial on estates.

2861. Carvalho, A., and Monteiro Salles, F. J.
Comércio de sementes selecionadas de café. **(Sale of selected coffee seeds.)**
Bol. Super. Serv. Café, S. Paulo, 1956, **31**(356): 7-17, bibl. 4, illus.

Methods are discussed of fixing the price of coffee seeds to allow for differences in weight due to variety or line and to moisture content. A table is given showing weight of 1,000 seeds, number and weight of seeds in a litre, and number of seeds in a kg., all at 11% moisture content, for various lines of Mundo Novo and Bourbon

Amarelo coffee. Data are given on variations in size and weight of seeds due to moisture content. It is concluded that seeds should be sold by weight, when dry or when facilities are available for determining moisture content and correcting to a standard; otherwise they should be sold by volume, 1 litre costing 2·5 times less than 1 kg. at the standard moisture content.—Inst. agron., and Inst. Penido Burnier, Campinas.

2862. Pagacz, E.
Utilisation en caféiculture d'un nouveau type de panier en matériaux durables. **(Use of a new durable type of basket in coffee growing.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 1-10, illus.

Open-ended cylinders of strong wire netting of 4–5 mm. mesh gave better results than the traditional basket, bamboo or leaf pots, used for raising cuttings in coffee nurseries. Much labour was saved, the cylinders could be buried during use and the end of the taproot, usually sacrificed when growing through basket or leaf pots, was retained.

2863. Suárez de Castro, F., and Rodríguez G., A.
Relaciones entre el crecimiento del cafeto y algunos factores climáticos. **(Relationships between the growth of coffee trees and some climatic factors.)**
Bol. téc. Fed. nac. Cafet. Chinchina-Caldas, 1956, **2**(16): 5-32, bibl. 9.

Extension growth of coffee trees was studied over a 5-year period in various localities in Colombia. The data, which are presented in graphs and tables, show that coffee trees continue growth throughout the year, but that in Colombia there are 2 peak periods of growth which coincide with the flowering seasons. Trees raised from cuttings always made more growth than trees raised from seed, the difference averaging 10%. Pruned trees made more growth than unpruned ones. There was no relationship between growth and the quantity of rainfall. There was a certain direct relationship between maximum and minimum growth and the average hourly temperature sums. It is recommended that fertilizers should be applied during the period of maximum growth, pruning should be done just before a peak growth period, and operations which might damage the root systems should be carried out at periods of minimum growth.

2864. Mendes da Ponte, A.
Ainda acerca do sombreamento dos cafezais —sua viabilidade nos planaltos de Angola. **(More about shading of coffee plantations—its chances of success on the plateaux of Angola.)**
Rev. Café portug., 1956, **3**(11): 15-25, bibl. 13, illus.

Advantages and disadvantages of shading are discussed and factors affecting its success are enumerated. Attempts to grow shade trees in Angola were unsuccessful in one region, but promising results were obtained elsewhere with native species of *Ficus*, *Acacia* and *Albizzia* and with introduced *Albizzia moluccana* and *Grevillea robusta*. Long-term experiments are planned for selecting the best species.

2865. Antunes (Filho), H.
Chuva em cafézal sombreado. **(Rain in a shaded coffee plantation.)**
Estado de S. Paulo, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1956, **31** (355): 48-9.

In studies carried out by the National Federation of Coffee Growers, Colombia, rainfall measurements were taken at various positions in a shaded coffee plantation. Only rainfall exceeding 1 mm. reached the soil underneath shade trees. When rainfall was less than 8 mm., more was recorded above than below the shade trees. When 28·5 mm. was recorded above the shade trees, however, 20·7 mm. was recorded immediately below a moderately dense canopy, 53·7 mm. below a dense canopy, and 61·9 mm. below coffee trees growing under a dense canopy. It is concluded that raindrops do not penetrate dense shade evenly but unite on the upper leaves and run down the branches and trunk.

2866. Medcalf, J. C.
Preliminary study on mulching young coffee in Brazil.
[*Publ.*] *IBEC Res. Inst.* **12**, 1956, pp. 47, bibl. 47, illus.

Heavy mulch applications in young coffee plantings increased yields by approximately 72% in the 1956 crop. There was a positive linear relationship between the amounts of mulch and yields. The yield response appears to be due largely to the improved root environment. Among the direct benefits from mulching is an increase in available soil moisture, a lowering of soil temperature, and an improvement in the chemical composition and physical conditions of the soil. Erosion control and soil conservation would be among the major indirect benefits from a mulch system. On the negative side, there is an increased danger from fire and frost with a mulch cover. However, it is believed that guard areas would minimize the fire danger and that the potential yield gains justify the increased frost hazard. From leaf analyses it was observed that the mulch plots had higher levels of P and K than the control plots. It was indicated also that heavy mulch applications in the initial stages tend to depress the availability of N and that additional N should probably be applied with the early mulch applications. Mulches apparently depressed the availability of Mn, and leaf values showed the control plots with more than double the Mn of the mulch plots. The critical leaf levels for Mn have not been completely established but this depression effect is believed to be beneficial. [From author's summary.]

2867. Robinson, J. B. D.
The influence of fertilizers and manure on the pH reaction of a coffee soil.
E. Afr. agric. J., 1956, **22**: 76-80, bibl. 10.

Results obtained from experiments during 1947–51 on soil-N in coffee plantations on the Kikuyu red loam soils (deep, free-draining lateritic soils developed over sheet lava, containing 55–65% clay fraction) have shown that regular annual dressings of ammonium sulphate quickly cause a substantial decrease in the pH of the top 6 in.; the effect is exaggerated when the fertilizer is applied in a band around the tree rather than broadcast. Double superphosphate fertilizer also caused a reduction in soil pH to a depth of 12–18 in. in one experiment. Regular applications of cattle manure have raised the pH of the top soil.—Coffee Res. Stat. Ruiru, Kenya. J.R.L.

2868. Lott, W. L., and others.
Leaf analysis technique in coffee research.
[*Publ.*] *IBEC Res. Inst.* **9**, 1956, pp. 26, bibl. 19.

Analytical procedures are described for N, P, K, Ca and Mg. Factors to be considered in sampling are discussed with reference to experimental data. Examples are given of the use of such data in interpreting the results of experiments, in which (1) mulching increased leaf P, (2) the effect of K fertilizer was independent of the time of application, and (3) irrigation in dry seasons accelerated N uptake.

2869. Medcalf, J. C., and Lott, W. L.
Metal chelates in coffee.
[*Publ.*] *IBEC Res. Inst.* **11**, 1956, pp. 19, bibl. 22, illus.

Soil applications of EDTA chelates of Cu, Fe, Mn and Zn separately and in combination to young coffee growing in a sandy soil in Brazil resulted in yield increases of over 200%. Leaf analysis of treated and control plots have shown that chelate applications reduced the levels of leaf Mn from an average of 1,113 p.p.m. in the controls to 522 p.p.m. It is suggested that the high leaf levels of Mn in the control plots may depress uptake of other essential elements. Chlorosis was generally less evident in treated plots than in the controls. Leaf levels of Fe showed seasonal variations in chelate-treated plots.

2870. Ochavillo, E. A.
Responses of coffee to deficiency of various elements in the culture medium.
Philipp. Agric., 1956, **40**: 315-34, bibl. 4, illus.

Young coffee seedlings were grown in sand with Hoagland's solution B, complete and lacking NO_3, NH_4, P, K, Ca, Mg, S, B, Fe, Mn or Zn. Symptoms, growth in height and leaf counts are recorded. Symptoms of N deficiency appeared in 2–4 weeks and of K deficiency in 3 weeks. but no distinct P-deficiency symptoms appeared until the 9th month. Ca deficiency in the early stages produced symptoms similar to those of K deficiency on the older leaves and to those of S deficiency on the younger leaves.

2871. Carañgal, A. R., Jr., Arnaldo, S. R., and Tucay, E. A.
Chemical studies on coffee grown in the Philippines. I. The non-nitrogenous organic acids of the leaves, shells, and beans.
Philipp. Agric., 1956, **40**: 99-103, bibl. 10.

Acetic, formic, oxalic, malic and citric acids and an unidentified acid (lactic and/or succinic) were found in the leaves, shells and beans of *Coffea robusta*, *C. liberica* and *C. excelsa*. The unidentified acid and oxalic acid were the predominant acids in the leaves and dried shells. Citric acid was predominant in raw and roasted beans of the 3 species. The acetic acid content was higher in roasted beans than in raw beans. The other acids were not affected by roasting. Healthy portions of *Coffea arabica* leaves infected with coffee rust had more of the unidentified acid but less citric and malic acids in the healthy parts than in the infected parts. [From authors' abstract.]

2872. Graner, E. A., and Goday, C., Jr.
As geadas e a poda dos cafèzais. **(Frosts and the pruning of coffee bushes.)**
Estado de S. Paulo, 6 June, 1956, reprinted in *Bol. Super, Serv. Café, S. Paulo*, 1956, **31**(352): 41-2.

Different degrees of pruning were compared on several varieties in localities subject to frost. The conclusions were that mature plants should be heavily pruned after a severe frost. Where frost was slight or its action was reduced by shade trees, pruning should be deferred until subsequent bud burst distinguished living from dead branches, when the latter could be removed.

2873. Willet, J. R., and Bérczy, L.
Penwortelziekte bij koffie. **(Tap root disease in coffee.)** [English and Indonesian summaries 17 and 19 lines.]
Bergcultures, 1957, **26**: 115-19, bibl. 5, illus.

A form of root decay is described, which has occurred in young coffee trees growing in certain soils which promote vigorous top growth but poor lateral root development. Rocking of the trees by wind contributes to the trouble. The disorder may be cured by cutting back to about 20 cm. and mulching round the trunks, and may be prevented by making larger planting holes and topping the trees at 1 m.

2874. Costa, A. S,, and others.
Bacterial halo blight of coffee in Brazil.
[German summary 1 p.]
Phytopath. Z., 1957, **28**: 427-44, bibl. 10, illus.

Several aspects of coffee halo blight (*Pseudomonas* sp.), including host range, economic importance and symptoms, are described. Experimental transmission tests were carried out and there were indications that the most probable mode of entry for the organism is by mechanical injuries indirectly caused by wind. The halo blight bacterium was still viable in dried coffee leaves after 90 days. In a fertilizer test K was found to increase the susceptibility of coffee plants to halo blight, P decreased it and N had no effect. Streptomycin had a strong antibiotic effect on the bacterium *in vitro*. In the greenhouse Phytomycin and Agrimycin 100 had only a slight effect on inoculated plants, and in the field the 2 antibiotics were almost ineffective. Only 2 copper compounds, out of 15 fungicides tested, showed a slight protective action.—Inst. Agron., Campinas, and Inst. Biol., S. Paulo, Brazil.

2875. Castaño A., J. J.
Mancha de hierro del cafeto. **(Brown eye spot of coffee.)**
Bol. inf. Café Chinchina-Caldas, 1956, **7**: 313-27, bibl. 9, illus.

The pathogen prevalent in Colombia is provisionally distinguished as var. *cenicaffaea* of *Cercospora coffeicola*. It can be controlled in exposed seed beds and nurseries by shading for the first 2 months and then applying either copper or dithiocarbamate fungicides such as ferbam or maneb.

2876. Bock, K. R.
Investigations on coffee berry disease—laboratory studies.
E. Afr. agric. J., 1956, **22**: 97-103, bibl. 11.

A preliminary study of this disease, ascribed to *Colleto-*

trichum coffeanum, has been made in the laboratory and in field trials. Host/pathogen relationships are reported and it is stated that sprays of Verdasan, griseofulvin and Perenox show some promise of controlling the disease [see also *H.A.*, 26: 4170]. Evidence is advanced in support of the theory that the apparent effect of altitude in limiting epidemic spread of the disease is an effect on the susceptibility of the host and not primarily an effect on the pathogen.—Dep. Agric., Kenya. J.R.L.

2877. Rodrigues Júnior, C. J.
Nota sobre a resistência de algumas espécies de *Coffea* à *Hemileia coffeicola* Maubl. et Rog. **(Note on the resistance of certain species of *Coffea* to *Hemileia coffeicola*.)** [English summary 1¼ pp.]
Rev. Café portug., 1956, **3**(12): 48-71, bibl. 11, illus.

Investigations carried out on St. Thomas island (Gulf of Guinea) showed that powdery rust (*Hemileia coffeicola*) was prevalent only in the humid area above 500 m. altitude. All plants of *Coffea arabica* inoculated proved highly susceptible, even those resistant to *H. vastatrix*. *C. racemosa*, generally susceptible to *H. vastatrix*, gave negative results when inoculated with *H. coffeicola*. Extensive lists of species, varieties and clones are given, showing immunity, susceptibility and slight reaction.

2878. Flores, M. A., Pazos, R., and LeBeau, F. J.
A canker disease of coffee in Guatemala.
From abstr. in *Phytopathology*, 1957, **47**: 11.

Infection by *Nectria dodgei* occurs only through wounds. When healthy trees in a severely infested area were wounded, 30% became infected within 15 days and 83% within 30 days. Wounds 6–12 in. above the ground had a higher incidence of infection than those 3–4 ft. above the ground. The common varieties of *C. arabica* and *C. liberica* are resistant to natural infection. [See also *H.A.*, 27: 1896.]

2879. Castaño A., J. J.
Utilidad de los bioensayos de laboratorio para determinar el valor fungicida de algunos productos comerciales contra el hongo causante de la gotera del cafeto. **(Applicability of laboratory bioassays for determining the fungicidal value of certain commercial products against the fungus causing leaf spot of coffee.)**
Bol. inf. Café Chinchina-Caldas, 1956, **7**: 350-4, illus.

Laboratory tests should be followed by field tests to give a reliable comparison of the action of fungicides against *Stilbum flavidum* [*Omphalia flavida*]. Manzate gave poor control under natural conditions after showing promise in bioassay, but the reverse was true of chloronitrobenzene compounds.

2880. Castaño A., J. J.
El arseniate de plomo (Du Pont Nu Rexform) en el control de la gotera del cafeto. **(Lead arsenate for control of coffee leaf spot.)**
Rev. cafet. Colombia, 1957, **13**(130): 36-44, illus.

The lead arsenate used was in finely divided form. Although apparently completely ineffective in laboratory tests against cultures of *Stilbum flavidum* it gave excellent control when sprayed as 0·5% solution on young coffee plants. Calcium arsenate was equally fungicidal, but caused leaf burn and defoliation. Copper fungicides gave good results, but captan (Orthocide 50) was less effective.

2881. Foucart, G., and Brion, L. Y.
Essais d'insecticides mixtes dans la lutte contre *Antestiopsis* et *Habrochila*, parasites du cafeier d'Arabie. **(Trials with mixed insecticides for the control of *Antestiopsis* and *Habrochila*, pests of arabica coffee.)**
Bull. Inf. I.N.E.A.C., 1956, **5**: 385-97.

Different concentrations (active material) of malathion, diazinon and chlorthion were mixed with 1%-active DDT. In tests against *Antestiopsis lineaticollis* malathion+DDT had the best direct and residual action. Chlorthion+DDT had the weakest direct action, but was equal or slightly superior to diazonon+DDT in residual action. Synergism was evident throughout in mixtures containing 0·03–0·06% of malathion. For control of *Habrochila ghesquierei* the best direct action was that of DDT+0·025% malathion, but complete control was also achieved 3 weeks after treatment with DDT+0·05% malathion. Excellent results were given by DDT+0·0175% parathion. [See also *H.A.*, 25: 3281.]

2882. Bitancourt, A. A.
O tratamento das cerejas de café para melnorar a bebida. **(Treatment of coffee berries for improving the beverage.)**
Biológico, 1957, **23**: 1-11, bibl. 4.

The flavour of coffee was markedly improved where the trees had been sprayed 3–6 times with bordeaux mixture before harvesting. Treatment of the harvested berries with either copper sulphate or sodium hyposulphite gave inconclusive results. Further experiments are proposed, to determine the minimum of treatments necessary in different seasons, favourable or unfavourable to fermenting organisms.

2883. Bitancourt, A. A.
As fermentações e podridões da cereja de café. **(Fermentations and rots of coffee berries.)**
Biológico, 1956, **22**: 205-13, bibl. 1, illus.

The microflora of coffee berries from several districts was not related to locality, time of ripening or degree of dryness. Production of good quality coffee necessitates preventing the growth of such microflora either by rapid drying in the sun or by using fungicides.

Mangoes.

(*See also* 2993f, 2994b.)

2884. Singh, L. B., and Singh, R. N.
Floral induction in axillary buds of mango shoots.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 265-9, bibl. 2, illus.

The authors conclude as follows: It seems probable, therefore, that a general hypothesis cannot be laid down regarding the floral induction in axillary buds and the hibiting effect of the terminal bud for all the geneti- lly different varieties of mango. From the above reliminary observations it is apparent that there is me substance (hormone), which is largely responsible r changing a leaf bud into a fruit bud, but that it is fective only provided leaves are present. How the aves effect bringing about this change ultimately is t known. Further, probably the optimum amount hormone required for axillary fruit bud formation purely a varietal characteristic and the varieties ficient in this minimum quantity may not produce illary fruit buds in spite of the presence of leaves.— ovt. hort. Res. Stat. Saharanpur, U.P.

85. BAJWA, B. S., BAKSHI, J. C., AND KOCHER, T. S.
A note on the floral biology of *Mangifera indica* L. variety Dusehri.
Indian J. Hort., 1956, **13**: 206-9, bibl. 6, illus.

study was made of the fruiting habit of 2 Dusehri ngo trees growing in the Government Garden and ursery, Jullundur, Punjab. Six terminal flower ds were removed each week during 5 weeks in nuary–February. Axillary inflorescences appeared 70% of the shoots from which the terminal flower ds had been removed. On some shoots axillary nicles appeared from the point of attachment of the evious year's panicle without any further vegetative owth. Both terminal and axillary panicles were ne on 16% of the new mature shoots, and some llary panicles appeared from the trace buds on old anches. Axillary panicles bore normal flowers. ese observations suggest that the problem of biennial ring should be tackled from the point of view of the ysiological changes connected with the emergence of llary panicles.

86. MALLIK, P. C.
Morphology and biology of the mango flower.
Indian J. Hort., 1957, **14**: 1-23, bibl. 12.

udies have shown that in mangoes maximum natural ination occurs between 10 a.m. and 12 noon. The ghest percentage germination of pollen grains in a % sugar medium was obtained with grains collected tween 8 and 10 a.m. in sunny, warm and humid eather. Fruits set within a week of pollination. uit drop is highest between mid-March and mid- ril.—Agric. Coll. and Res. Inst., Sabour, Bihar.

87. DAS-GUPTA, S. N., IYER, S. N., AND VERMA, G. S.
Studies in the diseases of *Mangifera indica* Linn. IX. Isolation of a brick-kiln fume constituent causing mango necrosis.
Indian J. agric. Sci., 1956, **26**: 259-66, bibl. 8.

vestigations are reported on the fractionation of the mes from a brick kiln situated near to a mango chard, in which the fruit suffered seriously from crosis each year. Fractionation of the residue tained from fumed ether and petroleum ether yielded crystalline compound containing sulphur and chlorine d having a melting point of 110·5° C.±0·5° C. solution of this fraction injected into healthy fruits duced typical symptoms of necrosis. Unfractionated residues from fumed solvents also induced necrosis but to a less marked extent.—Dep. Bot., Lucknow Univ.

2888. SOULE, M. J., JR., AND HARDING, P. L.
Changes in physical characters and chemical constituents of Haden mangos during ripening at 80° F.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 282-4, bibl. 3.

Samples of mangoes were removed daily from storage at 80° F. Rapid changes were noted during the first 3 or 4 days of ripening in flesh firmness, total soluble solids, total acid, ascorbic acid, numerical flavour rating, starch, sucrose and total sugars. Weight loss, solids-acid ratio and acidity (pH) showed comparatively uniform trends over the 9-day period of storage. Peak flavour of the fruit was obtained on the sixth and seventh days of ripening.—U.S.D.A., Orlando, Fla.

Oil palms

(*See also* 2659, 2993 l, 2994h, p, r, w, y, z, 2995m, 3017.)

2889. MINISTÈRE DE LA FRANCE D'OUTRE MER.
Comptes rendus de la conférence franco-britannique sur la palmier à huile, 15-25 janvier 1956. (**Report of the Franco-British conference on oil palms, 15-25 January, 1956.**) [English summaries of French papers, French summaries of English papers.]
Bull. agron. Fr. d'out. mer., 1956, No. 14, pp. 206, bibls.

The report comprises accounts of visits to Dahomey and the Ivory Coast and the original text, in French or English, of papers read on selection, natural groves of oil palms, agronomy, physiology and pathology. The papers [most of which are abstracted or noted separately] refer to recent work in French West Africa, the French Cameroons, Nigeria and the Belgian Congo. The final paper concerns research on coconuts in French West Africa. [See also next abstract.]

2890. PICHEL, R. J.
Quelques aspects de la culture du palmier à huile et du cocotier en A.O.F. Conférence franco-britannique sur le palmier *Elaéis* et le cocotier à Cotonou et Abidjan—Janvier 1956. (**Some aspects of the cultivation of oil palms and coconut palms in French West Africa. Franco-British conference at Cotonou and Abidjan, January, 1956, on oil palms and coconuts.**) [Flemish summary 8 pp.]
Publ. Serv. Agric. Minist. Colon. Congo belge, 1957, pp. 96, illus.

The work of the conference is reviewed with particular reference to: *Oil palms:* Research in French West Africa and Nigeria on cultural practices, nutrition, breeding and disease control, with brief additional reference to breeding in Sumatra and pollen studies in the Belgian Congo; and improvement of natural palm groves *versus* establishment of plantations. *Coconuts:* Planting and nutrition in Dahomey, diseases in Togo, propagation and selection in the Ivory Coast. [See also preceding abstract.]

2891. W.A.I.F.O.R.
Fourth Annual Report of the West African Institute for Oil Palm Research, 1955-56,
pp. 120, 2s. 6d.

The work of the research divisions includes: *Agronomy:* [see separate abstract]. *Chemistry:* determination of palm fruit mesocarp oil, soil studies. *Plant Breeding:* breeding, new progeny trials, inheritance studies, seed trials, variation in fruit colour, inheritance of leaf characteristics, the Deli palm, analysis of fruit and bunch composition, growth and flowering. *Plant Nutrition:* magnesium deficiency, nutrient deficiencies at Mbawsi, effects of B on little leaf disease. *Plant Pathology:* blast disease, anthracnose, freckle (*Cercospora* leaf spot) and crusty spot. *Plant Physiology:* physiology of germination, assimilation, stomata and stomatal movement, phyllotaxis. *Statistics:* uniformity data and statistical analyses.

2892. W.A.I.F.O.R.
Agronomy Division.
A.R. W. Afr. Inst. Oil Palm Res. 1955-56,
1956, pp. 30-62.

Nurseries. After pre-nursery germination of seedlings in raised trays, seedling selection based on root development increased numbers of transplantable seedlings. Leaf clipping of seedlings before nursery planting had a harmful effect, but root clipping may have advantages with fully-grown or over-grown seedlings. *Transplanting.* Root cutting before transplanting reduced the growth check at transplanting. Transplanting with a ball of earth and dipping roots in a clay slurry aids establishment, but severe leaf pruning at transplanting did not. Fertilizer application 3 weeks before transplanting had a good effect especially when seedlings were transplanted with a ball of earth. *Establishment.* Better palm growth was observed after land clearance by felling and burning than after felling without burning. Intensive intercropping has given low production even with manuring. High bunch production has been obtained from a plot opened up by burning, followed by regular inter-row cultivation. *Spacing.* High yields are being produced from a triangular plant, but are not expected to be maintained. *Manuring.* In long-term trials there are indications that broadcast K has a positive effect on yield. *Pruning.* Pruning of neighbouring palms to allow more light to reach the experimental palms, raised yields by altering the sex ratio or by reducing abortion and increasing average bunch weights, depending on the time of year in which the pruning was done. *Replanting.* The presence of old palms markedly reduced the growth and yields of young palms. *Maintenance of soil fertility.* No marked differences were observed between several cover crops tested.

2893. Prevot, P.
Recherches agronomiques de l'I.R.H.O. sur le palmier à huile. (**Research on oil palms by the Institut de Recherches pour les Huiles et Oléagineux.**) [English summary ½ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14,
pp. 150-7.

Instances of K and Mg deficiencies were revealed by fertilizer experiments. In some cases palms benefited from the cultivation of food crops under them. Other lines of research in progress are outlined.

2894. Hartley, C. W. S.
The improvement of the West African natural palm groves. [French summary ¾ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14,
pp. 67-75.

Replanting with non-selected material in natural groves gave very low yields even on good soil. In native-worked groves the growing of vegetables among the palms reduced yields. In natural groves the denser the population up to about 100 adult trees per acre, the higher was the yield per acre, whereas in plantations the uniform height of trees necessitated wider spacing. Major nutrients were often deficient. In current comparisons of replanting systems the advantage of removing old palms is already apparent.—W.A.I.F.O.R

2895. Gascon, J. P., and Prevot, P.
Orientation de la sélection du palmier à huile à l'I.R.H.O. (**Preliminary work on selection of oil palms at the Institut de Recherches pour les Huiles et Oléagineux.**) [English summary ¼ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14,
pp. 42-7.

Yields are quoted from young plantations in the Ivory Coast, Dahomey and Middle Congo. The characteristics receiving particular attention are fertility in *pisifera*, dwarf trees, resistance to heart rot and rapid germination. As more fertile strains of *pisifera* are produced, *dura* × *pisifera* crosses will gradually replace *dura* × *tenera* crosses.

2896. Gascon, J. P.
Étude sur les *pisifera* et les croisements *dura* × *pisifera*. (**Study of *pisifera* and of *dura* × *pisifera* crosses.**) [English summary ½ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14,
pp. 48-58, bibl. 17.

Causes and manifestations of sterility in *pisifera* are discussed. Very promising results have been obtained by other workers from *dura* × *pisifera* crossings, suggesting that Deli *dura* × *pisifera* may be equally or more productive.

2897. Pichel, R. [J.].
L'amélioration du palmier à huile au Congo belge. (**Selection of oil palms in the Belgian Congo.**) [English summary ½ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14,
pp. 59-66.

High yielding *dura* × *pisifera* material is now available to planters. Annual yields are as high as 2,500–2,900 kg. of palm oil per ha. Further work is outlined.

2898. Purvis, C.
The colour of oil palm fruits.
J. W. Afr. Inst. Oil Palm Res., 1957, **2**:
142-7, bibl. 3, illus.

In the Belgian Congo oil palm fruits have been divided into 2 main colour groups, *nigrescens* and *virescens.* Recent studies at W.A.I.F.O.R. have shown that both types can be divided into sub-types. The main distinction between sub-types is in the colour of the fruit when ripe—red or orange. It has been found that the oil from the red-fruited type has a colour value about 4 times higher than that from the orange-fruited types and that the carotene contents of the mesocarp show similar differences. The distribution of the colour types found in one natural palm grove is recorded.

2899. Broekmans, A. F. M.
The production of improved oil palm seed in Nigeria.
J. W. Afr. Inst. Oil Palm Res., 1957, **2**: 116-32, bibl. 6.

The history of seed production in Nigeria, using controlled pollinations, is outlined. In 1954 a new phase began with the start of seed production at W.A.I.F.O.R. Main Station, which is based mainly on 5 *dura* and 4 *tenera* parents selected from a plot at Aba. These Aba selections, in contrast to earlier selections, are characterized by a high kernel content and a correspondingly lower mesocarp content. In the author's opinion future breeding work should be directed to the raising of two types of *tenera*, one of the Aba type, with a relatively high kernel content, for distribution to farmers, and the other, which might be called the Yangambi type, with minimum contents of shell and kernel, for the establishment of large plantations. In 1956 new selection standards were adopted at W.A.I.F.O.R. for both *tenera* and *dura* palms with respect to shell content, the proportion of kernel plus mesocarp to bunch, yield of kernel plus mesocarp over the first 10 years, yield in relation to palm height at 10 years and palm height at 15–17 years.

2900. Desneux, R.
La germination des graines d'*Elaeis* en chambre chaude à la Station de Kiyaka. **(Germination of oil palm seeds in heated chambers at the Kiyaka Station.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 11-19, bibl. 2, illus.

Plans of the chamber are provided. The seeds are placed in perforated germination trays after mixing with moist wood charcoal of particle size 1–5 mm., and the trays are watered daily and examined frequently to prevent caking. Temperature is kept between 35 and 40° C.

2901. Hussey, G. G.
The physiology of germination of oil palm seed. [French summary ⅓ p.]
Bull. agron. Fr. d'out. mer, 14, 1956, No. 14, pp. 173-80, bibl. 1.

Excised embryos germinated readily at 25° C. and twice as rapidly at 40° C. Seeds (kernels) did not germinate at 25° C. even in pure oxygen. At 40° C. their germination was far more rapid in oxygen than in air. Temporary reduction of temperature from 40° C. to 30° C. substantially increased germination and raising the oxygen supply at this stage gave an additional increase. For germination of nuts the optimal water content of the shell was 22–24%; below 18% and above 30% germination was completely checked.—W.A.I.F.O.R.

2902. Sparnasij, L. D.
Recent work on transplanting technique. [French summary ¾ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 126-36.

Experiments showed that oil palm seedlings could be successfully transplanted without balls of soil, provided that root pruning was carried out a month beforehand and the bare roots were coated with clay. Of two local clays tested, one was greatly superior to the other. Fertilizer application at or near transplanting time checked growth for a considerable time. In general, there were no adverse results from applications made 3 weeks before transplanting, but seedlings with uncoated roots were affected if the weather was dry.—W.A.I.F.O.R.

2903. Broekmans, A. F. M.
Factors influencing the periodicity of growth and flowering in the oil palm. [French summary ¾ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 163-72.

Certain external, mainly climatic, stimuli may affect, indirectly and over long periods, the internal state of the tree. The abortion rate is high in young, but low in healthy mature palms. The relatively low sex ratio in West African palms may be due to lack of sunshine and irregular rainfall distribution. Preliminary tests suggest that the yield of high sex-ratio strains is less affected by drought than that of normal or low-ratio strains.—W.A.I.F.O.R.

2904. Henry, P.
Morphogenèse foliaire et florale chez le palmier à huile. **(Foliar and floral development in oil palms.)** [English summary ¼ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 158-62.

Three main stages can be distinguished in the life of a leaf, namely, a formation stage occupying about 50% of the total period, an elongation stage 8–9%, and a functioning stage. The full life cycle is about 3 years in Ivory Coast palms compared with 4 years in Dahomey palms. The pattern of development of inflorescence is similar.

2905. Wormer, T. M.
Mise au point d'une technique pour l'étude du bilan d'eau du palmier à huile (*Elaeis guineensis*). **(Development of a method for investigating water balance in oil palms *Elaeis guineensis*.**
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 181-90, bibl. 6.

Of the current methods of measuring transpiration, the most suitable for oil palms were Molisch's (estimating stomatal aperture by infiltration of alcohol-water mixtures) and Sivadjian's hygrophotographic determination of transpired moisture [*H.A.*, 24: 79z]. Accurate water-deficiency determination from fresh weight, saturation weight and dry weight of leaflets demands that these shall be of equal physiological age and that standard sized discs of tissue are used.

2906. Bull, R. A.
Techniques for the visual diagnosis of mineral disorders and their application to the oil palm. [French summary 1 p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 137-49, bibl. 44.

The effects of various factors on the visible manifestation of deficiencies are discussed. The limitations of methods of visual diagnosis are pointed out, and other diagnostic techniques are briefly discussed. No one method is considered wholly reliable, and a combination of as many as possible is advocated.

2907. BROEKMANS, A. F. M.
Studies on the controlled pollination of the oil palm. [French summary 1 p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 37-41.
Studies of factors influencing the success of controlled pollination of the oil palm.
J. W. Afr. Inst. Oil Palm Res., 1957, **2**: 133-41, bibl. 1.

Pollen was satisfactorily dried either in an enclosed space over calcium chloride or in an oven at 45° C., but viability after a month's storage was lower than in naturally dried pollen. The optimal water content for storage was 12%. Viability was best conserved by storage at 5° C. and 25–35% R.H. Receptivity of female flowers was highest on the second day of flowering, and a single bunch pollination at this stage gave 65% fruit set as against 70–80% [total] from similar pollinations on 3 consecutive days. Pollen was often much more viable in practice than was indicated by tests with maltose agar. The use of 10% formaldehyde sprays before pollination was not harmful, although it has been shown that concentrations as low as 1 : 10,000 are toxic to pollen.

2908. DESASSIS, A.
Variation des constituants du fruit du palmier à huile durant sa maturation. **(Variation in the components of oil palm fruits during ripening.)** [English summary 4 lines.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 201-3.

The content of oil+water in the pulp is so nearly constant that the oil content may be calculated from determinations of the water content. During ripening, oil and nitrogen increase, phosphorus remains approximately constant and there are decreases in water, potassium, calcium and magnesium in the pulp. [See also *H.A.*, 26: 2219.]

2909. PRENDERGAST, A. G.
Observations on the epidemiology of vascular wilt disease of the oil palm (*Elaeis guineensis*, Jacq.).
J. W. Afr. Inst. Oil Palm Res., 1957, **2**: 148-75, bibl. 19, illus.

The symptoms of vascular wilt have been more fully described than previously. Evidence has been presented of the way in which the disease spreads in a plantation and the succession that may be expected when a diseased area is replanted. Facts relating to the effects of fertilizers, variety of palm, age, and some environmental conditions on the incidence of disease have been given and discussed. In the particular area studied the disease has little effect on the overall yield of an area of palms, since unaffected palms quickly respond to the progressive thinning. There is significantly less disease on areas which receive adequate amounts of potassium fertilizers. The possible role of potassium and some environmental conditions on disease incidence have been discussed. [Author's summary.]—Pamol Ltd. Res. Dep.

2910. ROBERTSON, J. S., AND BULL, R. A.
The blast disease of oil palm seedlings. [French summary ¾ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 191-200, bibl. 12.

In Nigeria this disease of seedlings appears at the beginning of the dry season. It seems probable that it is caused by *Rhizoctonia lamellifera* and an associated unidentified Oomycete. Very limited control was achieved by irrigation, but this was not effective in basket nurseries in the Cameroons.—W.A.I.F.O.R.

Pineapples.

(*See also* 2810, 2831.)

2911. MALAYA DEPARTMENT OF AGRICULTURE.
Notes on current investigations (research) January to March, 1956. Pineapple.
Malay. agric. J., 1956, **39**: 144-6.

Fruit from 2 K_2O manurial trials was analysed. Total sugar and K content increased with increasing K_2O up to the maximum application (200 lb. per acre). When 50 lb. per acre of K_2O was applied as muriate there was a sudden increase in total acidity and fall in pH. Fruit quality was not significantly affected by the type of K_2O applied. In another plot the numbers of pineapple plants heavily infested with mealy bug (*Dysmicoccus brevipes*) were reduced by sprays of dieldrin at 0·17%.

2912. EVANS, H. R.
The influence of fertilizers on pineapple replant areas.
E. Afr. agric. J., 1957, **22**: 122-6, bibl. 1.

Further results of a replanting trial with pineapples are given [for an earlier report see *H.A.*, 26: 1164]. Application of sulphate of ammonia (2,000 lb. per acre) not only increased yields but accelerated fruiting during the early part of the season and increased plant vigour. Losses after post-planting ethylene dibromide fumigation were reduced when combined with fertilization. Fe and Mg sprays at 2% did not significantly increase yields, except when Fe was combined with EDB fumigation, but Mg significantly increased mean fruit weight.—Dep. Agric., Kenya.

2913. SAMUELS, G., LANDRAU, P., JR., AND ALERS ALERS, S.
Influence of phosphate fertilizers on pineapple yields.
J. Agric. Univ. P.R., 1956, **40**: 218-23, bibl. 6.

In trials on plant and ratoon pineapples the application of amounts of P_2O_5 up to 56 lb. per acre increased yields slightly or had no effect. Applications of 84 and 112 lb. depressed yields and tended to hasten fruiting and increase the proportion of culls.

2914. VAN LELYVELD, L. J.
Pineapples. Sun scald—most dreaded enemy.
Fmg S. Afr., 1957, **32**(10): 28-32, illus.

Sun scald, to which pineapple fruits are most sensitive in the 3–4 weeks before ripening, may produce external or internal symptoms, which are described. The factors predisposing fruits to injury are enumerated. Covering the fruit with shields is the best method of protection so far discovered. Measurements of internal temperatures of fruits under 4 types of shield and of unshielded fruits have shown that the shields markedly reduce fruit temperatures during the hottest times of the day.—Pineapple Res. Stat., E. London.

2915. Oxenham, B. L.
Diseases of the pineapple.
Qd agric. J., 1957, **83**: 13-26, illus.

An outline is given of the precautions necessary to reduce losses due to top rot (*Phytophthora cinnamomi* and *P. parasitica*); root rot wilt (*P. cinnamomi* and other fungi); base rot, white leaf spot and water blister (all caused by *Thielaviopsis paradoxa*); fruitlet core rot (*Penicillium* spp. and *Fusarium* spp.); marbling; yeasty rot and pink disease. Symptoms are also described and illustrated. J.R.L.

2916. Edmonstone-Sammons, C. P.
Pineapples. Black spot: symptoms and control.
Fmg S. Afr., 1957, **32**(11): 22-3, 25, illus.

Penicillium funiculosum and *Fusarium moniliforme* were the fungi most often isolated from pineapples with black spot, but they are not considered to be the primary factors causing the disease. The incidence of black spot could be correlated with rainfall. Studies on the possible control of black spot are in progress.—Pineapple Res. Stat., E. London.

Rubber trees.

(*See also* 2659, 2993c, m, q, 2995o.)

2917. I.R.C.I.
Institut des Recherches sur le Caoutchouc en Indochine. Rapport Annual 1955. (**Annual Report of the Institute for Research on Rubber in Indo-China for 1955**), 1956, pp. 210, illus.

Results of the following studies are given: Clone selection, breeding (including artificial pollination studies), stock-scion relationships, problems of tapping, planting density, manuring, tree selection for quality at an early age, latex stimulation, pest and disease control.

2918. Tong, T. H.
Ein beschouwing over plantverbanden in nieuwe rubbertuinen. (**A discussion on planting distances in rubber plantations.**) [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1956, **25**: 587-606, bibl. 30.

An initial planting density of 160–200 trees per acre is recommended for the east coast region of Sumatra. Close hedge planting is not recommended, but other spacings with wide inter-rows, which allow for mechanization, such as the rectangular and moderate avenue systems, may be used.

2919. Tong, T. H.
Resultaten van een uitdunningsproef in een oculatieaanplant op Polonia. (**Results of a thinning experiment in a budded plantation on Polonia.**) [English and Indonesian summaries ½ p. each.]
Bergcultures, 1957, **26**: 3-9, bibl. 6.

The yield per acre from a rubber plantation was unaffected by thinning, as production from the remaining trees was improved. Thinning also improved bark renewal, which took place more quickly in younger trees than in older trees. Yields from virgin and renewed bark in general increased with age and with decreased tapping height. Variations in yield occurred when the tapping cut approached the stock-scion union or when it was transferred to a higher tapping panel. It is suggested that decline in production might be avoided by starting tapping directly at 50 in. or higher.—Alg. Proefst. AVROS, Medan.

2920. Beaufils, E. R.
Onderzoek naar een rationale exploitatie van hevea. (**Studies aimed at the rational management of hevea.**) [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1957, **26**: 95-107, bibl. 16, illus.

A survey is given of the method of determining nutrient status developed in Indo-China. The method is based on a comparative study of mineral assimilation (leaf analysis) and consumption of assimilated minerals (analysis of latex and seeds). In leaf analysis, N, P, K, S, Ca, Mg, Mn and Cu are determined and in the latex N, P, K, Mg and Cu. Ratios between these elements are calculated and compared with values found under normal conditions. The correction of disturbances in the physiological equilibrium, which are reflected in these ratios, is described.—Inst. Rech. Caoutch. Indochine. [See also *H.A.*, 26: 1182, 3158 and 27: 902.]

2921. Bolle-Jones, E. W., and Mallikarjuneswara, V. R.
Rubber formation in *Hevea brasiliensis* as affected by light and mineral status.
Nature, 1957, **179**: 1199-1200, bibl. 5.

Rubber seedlings were grown in soilless culture, both in the light and in the dark, and subjected to 4 nutrient treatments. Thirty-one, 47 and 66 days after sowing the plants were bulked, killed and dried and analysed for rubber, total carbohydrates and total protein. The results "do not permit any conclusion other than that the production of rubber is closely allied to the growth of the plant; whether rubber is a food reserve or a waste by-product of growth processes still remains to be resolved".

2922. Bolle-Jones, E. W., and Mallikarjuneswara, V. R.
A beneficial effect of cobalt on the growth of the rubber plant (*Hevea brasiliensis*).
Nature, 1957, **179**: 738-9, bibl. 7, illus.

Rubber plants grown in sand culture were supplied with a basal nutrient and three levels of Co, namely, nil, 0·005 p.p.m. and 0·25 p.p.m. Although no symptoms attributable to Co deficiency were recorded, the plants receiving 0·005 p.p.m. grew taller and had larger girths and root dry weights than the plants given no Co. In general, the effects of the highest rate of Co were intermediate. The Co content of the treated plants increased with time but without having any marked effect on the accumulation of N, P, K or Mg. In a subsidiary experiment with tomatoes as the test plant Co had no effect on shoot or root dry weights but halved the weight of fruit produced.

2923. Bolle-Jones, E. W.
Molybdenum status of laminae as determined by bioassay and chemical methods.
Plant and Soil, 1956, **7**: 130-4, bibl. 5.

Hevea seedlings were grown in sand culture at uniform Mo level, but at subnormal levels of Fe, Mn, B, S and major elements. Determinations of foliar Mo were carried out by chemical analysis using dithiol and amyl acetate and by bioassay with *Aspergillus niger*. Both methods showed distinct Mo accumulation in S-deficient leaves and a tendency to low Mo content with P deficiency. Chemical analysis showed no other significant actions, but bioassay revealed a distinct depression of Mo in K-deficient leaves and also, in some cases, in N- and B-deficient leaves. It is suggested that bioassay of foliar Mo might be of assistance in confirming deficiencies of N and S, which in hevea are difficult to distinguish visually or chemically.—Rubb. Res. Inst., Malaya.

Sugar cane.

(*See also* 2012, 2831, 2993g, k, s, x, y, 2994a, m, t, u, 2995b-g, i, l, n, s, 3024a.)

2924. Anon.
Research at the Houma Station.
Sugar J., 1957, **19**(10): 27, 30.

Work in progress at the Sugarcane Field Station, Houma, La, includes studies on the tolerance of varieties to cold (with the aid of new low temperature control equipment), the responses of cane to gibberellic acid, the control of ratoon stunting disease with heat, the biological and cultural control of borers, the chemical control of soil pests and of the sugar cane beetle, and the development of new planting and harvesting machines.

2925. Chinloy, T.
Certain aspects of the cane yield survey.
J. Jamaican Ass. Sugar Tech. for 1954, **17**: 23-4.

In the 5-year period 1938–42, when there were no B varieties in Jamaica, the average yield was 27·8 tons cane per acre per annum. In the period 1950–54, with 88% of the acreage planted to B varieties, the average was 31·6 tons. The upward trend in the intervening years was closely related to the proportion of the total acreage planted to B varieties. Estimates of the productivity rate (cwts. sugar formed per acre per month) have shown the desirability of relating performances of separate estates to the performances of the areas in which they are located rather than to overall averages; thus, fully irrigated estates have consistently shown higher productivity ratings than high- or medium-rainfall estates and the latter than dry-area estates. The survey has also thrown further light on the relationship, under irrigated conditions, between yield and the length of the growing period.—Sugar Res. Dep., Sugar Manuf. Ass. Jamaica.

2926. Campbell, J. S., and Rosher, P. H.
The use of wheeled tractors of medium power for sugar cane cultivation in Trinidad.
Int. Sugar J., 1957, **59**: 88-90, bibl. 1.

The Imperial College of Tropical Agriculture has cleared an area of 200 acres of bamboo to form New Farm, on which mixed farming operations are performed whenever possible with the aid of machinery. Half the area (100 acres) is planted in sugar cane, and a system of cane cultivation has been developed over 6 years, which is based on the use of 2 Ferguson tractors with a range of ancillary equipment. The various operations and the implements used are here described and cultivation costs for plants and ratoons are tabulated.

2927. Anon.
Results of sugarcane variety tests during 1953-1954. [Chinese, with English summary 3 pp.]
Rep. Taiwan Sugar Exp. Stat., 1954, No. 12, pp. 1-31 [received 1957].

The results are given of trials in which the cane and sugar yields of over 100 new varieties bred at Taiwan Sugar Experiment Station were compared with those of N:Co. 310. Susceptibility to various diseases was also tested. The main characteristics of 12 selections are described. J.R.L.

2928. Tabayoyong, F. T.
Sugar cane variety test.
Sugar News, 1957, **33**: 8-13.

Ten varieties were each given the same fertilizer treatment, equivalent to 120–120–120 Kg. of N–P_2O_5–K_2O per ha. Highly significant differences in cane and sugar yields were obtained between varieties. When arranged according to their sugar yields the highest yielders giving statistically similar sugar yields were: H.32-8560, H.37-1933 and H.44-3098; the second highest were: Q.47, H.46-3289, C.P.29/116 and N:Co.310; the third highest: Q.50 and Co.475; and the lowest, P.O.J.3016. [From author's abstract.]—Victorias Milling Co.

2929. Tabayoyong, F. T., and Ferraris, I. P.
Field preparation × furrowing × time of nitrogen application.
Sugar News, 1956, **32**: 644-51.

In an experiment using H.37-1933 complete and thorough preparation of the land by ploughing and harrowing was compared with subsoiling only. Three systems of planting were used, namely, deep (16-in.) furrows planted at once, shallow (8-in.) furrows planted at once and deep furrows exposed for 6 weeks before planting. Full and split applications of N were tried in each case. Canes harvested a year later showed no significant differences in yields of cane or sugar between treatments. Canes grown without ploughing and harrowing, but with deep and exposed furrows and with the full N application at planting time gave the most economical returns.—Victorias Milling Co. Exp. Stat. J.R.L.

2930. Wightman, G. M.
The effect of spacing on plant population.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 17-21.

In a spacing trial on rather poor land there was an average of 9·6 tillers per stool 4 months after planting but only 4·0 tillers per stool when the crop was harvested. Most of the surviving tillers were among the first 6 produced by each stool, all of which had appeared within 2 months of planting. Apart from minor variations this was true for 3 different spacings and

4 different methods of planting.—Worthy Park, Ltd., Jamaica.

2931. CHAO, C. K., AND CHENG, C. F.
Studies on the tilling of new sugarcane varieties 34-1428, 37-435, P.T.43-52 and N:Co.310. [Chinese, with English summary $2\frac{1}{2}$ pp.]
Rep. Taiwan Sugar Exp. Stat., 1954, No. 12, pp. 50-84 [received 1957].

The history was recorded of each tiller on 100 plants selected at random from autumn and spring plantings of each of 4 cane varieties. At harvest stalks of the same age were weighed together to evaluate their contribution to the total yield. With autumn plantings N-Co.310 tillered earlier and produced many more tillers (35) over a longer period than plants of the other varieties (13–14). Between 76 and 86% of the tillers died, mainly through attack by the stem borer *Chilo infuscatellus*, mortality being highest among those developing late. The earlier tillers yielded better than the later ones and were also somewhat better in yield and juice quality than mother stalks. With spring plantings the number of tillers produced was smaller (7·3 to 5·4 for all varieties). They were produced later in the year, but N:Co.310 again had a longer tillering period than the other varieties. The mortality rate was lower (36–51%). As with the autumn plantings the early tillers yielded better than mother stalks or late tillers. J.R.L.

2932. SHIH, S. C., AND OTHERS.
An investigation on the root system of sugarcane. [Chinese, with English summary $1\frac{1}{4}$ pp.]
Rep. Taiwan Sugar Exp. Stat., 1954, No. 12, pp. 32-49, bibl. 11, illus. [received 1957].

The root systems of F.134, P.O.J.2883, F.108 or P.T.43-52 grown on several clay loam soils were examined and weighed 5 and 15 months after planting. The total dry weights of roots differed significantly between varieties, the greatest weight of roots being found with F.134. In heavy soils or under conditions of excessive moisture the roots tended to spread laterally more than in drier conditions. If the number of tillers was restricted the weight of roots decreased significantly. No fixed ratio of shoot to root was found in any variety studied, but in general the ratio increased as the plant grew older. J.R.L.

2933. LIU, P. D., AND SUN, V. G.
An investigation on the water requirements of spring planted F.134 cane in Tainan. [Chinese, with English summary $1\frac{1}{2}$ pp.]
Rep. Taiwan Sugar Exp. Stat., 1954, No. 12, pp. 85-106, bibl. 2 [received 1957].

In greenhouse studies soil moisture was controlled at average levels of 30%, 50% and 70% of field capacity, and at the two higher levels both normal and heavy dressings of fertilizers were applied. It was found that: (1) The net water requirement varied with the treatment. (2) More early tillers were formed when the soil moisture was at 30% and more late tillers when it was at 70% than at the other levels. (3) The higher soil moisture levels and lower levels of fertilizer produced plants with the longest stalks, and the elongation rate appeared to be correlated with both soil moisture and air temperature. (4) The yield of millable cane was highest in plants grown at high moisture levels and low fertilizer levels. (5) Differences in the dry matter of millable cane were significant as between different soil moisture treatments but not between the two fertilizer levels in the same moisture treatment. (6) When more water was applied the plant used less water to produce 1 kg. of dry matter. J.R.L.

2934. THOMPSON, H. A.
Overhead irrigation.
J. Jamaican Ass. Sugar Tech. for 1952 and 1953, **16**: 1-3 [received 1957].

In preliminary trials, in which sprinkler irrigation was compared with flood irrigation on soils of medium texture, the former resulted in appreciably greater yields of cane per acre, produced at lower costs per ton and with substantial reductions in the amounts of water used. Experience suggests that for sprinkler irrigation under the conditions of these trials about 1·5 in. should be applied every 10 days to ensure optimum growth. The effects of wind on overhead irrigation are discussed.—W. Indies Sugar Co., Monymusk.

2935. DU TOIT, J. L.
Fertilizer responses as revealed by exploratory trials.
S. Afr. Sugar J., 1957, **41**: 213-23.

A series of 3×3×3 fertilizer trials, with N, P_2O_5 and K_2O at levels of 0, 100 and 200 lb. per acre, was started in 1950. To date 28 trials have been harvested as plant cane and 21 as first ratoons. In general, responses to N and K have been marked, particularly in ratoon crops. Responses to P have been smaller and restricted to certain soil types. N, particularly in plant canes, and P tended to depress sucrose content, but the reductions were small.—Mt Edgecombe Exp. Stat.

2936. GARRUCHO, S. S.
The response of P.O.J.3016 to the addition of nitrogen, phosphorus, and potassium.
Philipp. Agric., 1957, **40**: 460-8, bibl. 7.

Various levels and combinations of N, P and K were applied to P.O.J.3016. In general cane maturity did not vary with treatment except in some replanted canes. Weights of tops and fresh leaves showed no significant variation between treatments. In comparison with the non-fertilized plots, applications of 45 kg. N/ha. (with or without P and K) resulted in increases in sugar yields of 44·88 piculs* of sugar per hectare, and 90 kg. N/ha. increased yields by an average of 67·69 piculs* sugar per hectare.

2937. SAMUELS, G.
The efficiency of sugarcane in its use of nitrogen fertilizer applications.
J. Agric. Univ. P.R., 1956, **40**: 209-17, bibl. 2.
Cultivation of sugarcane with nitrogen fertilizer.
Sugar J., 1957, **19**(12): 43-5.

The efficiency of sugar cane in using applied N was evaluated for 127 fertilizer tests. Fall and spring plantings were more efficient users of N than were ratoon canes. Canes in humid areas were less efficient

* Philippine picul = 63·25 kg.

users of applied N than those in irrigated areas. Canes in semi-arid areas used less N than did those in semi-irrigated areas. There was an increase in tons of sugar per acre per month with increases in the N applied per acre. The cane used about the same amount of applied N per ton of cane produced at either low or high rates of sugar production per acre per month. Yields of tons of sugar per acre per month showed an excellent positive linear relationship with tons of cane per acre per month. The increase in cane tonnage did not show any tendency to lower sucrose values at the higher cane tonnages. Taking the production of over 0·50 tons of sugar per acre per month as a criterion of very good sugar yields, this required an average of 3 lb. of N per ton of cane and 23 lb. per ton of sugar. When cane N efficiency in Puerto Rico and Hawaii in producing over 0·50 ton of sugar per acre per month was compared, it was found that both required about the same rates of N per acre, but in Hawaii the cane used 3 lb. less N per month, 1 lb. less N per ton of cane, and 6 lb. less N per ton of sugar than in Puerto Rico. [From author's summary.]

2938. Thompson, H. A., Campbell, D. B., and Floyd, F. J.
A preliminary investigation into the use of aqueous ammonia as a fertilizer for sugar cane at Monymusk.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 21-8.

The results of 2 preliminary trials on plant and ratoon cane indicate that, compared with sulphate of ammonia, the returns from nitrogen applied as ammonia, either in irrigation water or by soil injection, may well be so low as to offset the price differential existing, per unit of nitrogen, between sulphate of ammonia and aqueous ammonia. The importance of obtaining good coverage of the ammonia is indicated. The difficulty of application through trash and of obtaining good cover in plastic marine clay soils will require careful design of equipment and may well limit the conditions under which ammonia can be used economically. [From authors' conclusions.]

2939. Lal, K. N., and Tandon, J. N.
Physico-chemical properties, growth and juice characters of sugarcane in relation to nitrogen supply.
Indian J. agric. Sci., 1956, **26**: 301-18, bibl. 2.

Growth, yield, sucrose, and various physico-chemical properties of leaf and stalk sap were investigated in 16 sugar cane varieties grown under field conditions with 3 levels of applied N, namely, 0, 60 and 120 lb. per acre. In some varieties there appeared to be a relationship between growth characters on the one hand and such physico-chemical properties of the sap as electrical conductivity, osmotic pressure and density on the other, but the variations shown by other varieties were too great to establish any general relationship. In most cases the highest dose of N resulted in the greatest growth and also in increased density, surface tension, viscosity and electric potential of the leaf sap as well as in a higher bound water content of leaf and stem tissues. Observed yields and potential maximum yields based on Mitscherlich's formula were calculated for 3 of the better varieties. Observed yields with 120 lb. N were only 45 to 47·3% of the potential maximum.—Coll. Agric., Banaras.

2940. Chao, T.-T., and Lee, F.-V.
Studies on the fertility of Taiwan sugarcane fields. IV. Results of field demonstration plots on phosphorus and potassium requirements of different sugarcane soils. V. Correlation between "available" forms of soil phosphorus. VI. Relation of potassium status in the soil to the responsiveness of sugarcane to potash fertilizers. [Chinese, with English summaries 2 pp., 1½ pp. and 2 pp.]
Rep. Taiwan Sugar Exp. Stat., 1954, No. 12, pp. 107-19, bibl. 6; pp. 120-30, bibl. 12; pp. 131-45, bibl. 31; [received 1957].

Two years' results are given of 60 field trials laid down to test the effect of applications of P and K fertilizers on N:Co.310 and F.134 plants growing on various alluvial soils. *Part IV.* The increase in yield due to K applications was found to be greatest on red earth soils, slightly less on slate alluvial soils and there was least response on sandstone and shale alluvial soils. There was little response when P fertilizers were applied. *Part V.* Three methods of extraction used in determining the available P status of the soils in the trial plots are compared. *Part VI.* The relationship between exchangeable K in soils and the response of the cane plants to K fertilizers is discussed. A table is given in which exchangeable K is used as a diagnostic tool to determine the fertilizer requirement of the soil.
J.R.L.

2941. Chilton, S. J. P., and Paliatseas, E. D.
Studies on the flowering of sugarcane.
Sugar J., 1957, **19**(11): 24, 38.

Eighty-one varieties of cane, representing a wide range of types were subjected on May 21 to a photoperiod of 12 hrs 44 mins plus the period from sunset to darkness. Thereafter for 80–85 days the photoperiod was reduced each day by 1 min. In all 34 varieties were induced to flower, the first floral initial being found on Aug. 1 and the last on Sept. 5. The first flower emerged on Aug. 25 and the last on Feb. 25.—La agric. Exp. Stat., Baton Rouge.

2942. Chacravarti, A. S., and others.
Studies on hormone treatment of sugarcane. I. Pot experiments with 2,4-D.
Proc. Indian Acad. Sci. Sect. B, 1957, **45**: 9-15, bibl. 16.

Pot experiments in two years are reported. In the first the sodium and amine salts of 2,4-D were applied to the soil at planting time at rates equivalent to 3, 6 and 9 lb. per acre. The sodium salt had no effect, but the amine salt increased sugar contents by about 2·6 units and depressed yields by 40%. In the second year the two 2,4-D salts were applied to the soil or as foliage sprays at various stages from 2 weeks after germination to 20 days before harvest. Compared with untreated controls both types of application and both salts significantly increased sucrose % cane, brix and purity, without depressing yields to a significant extent.—Centr. Sugarcane Res. Stat., Pusa.

2943. Sen, S. C.
Effect of spraying molasses on cane leaves.
Sugar, N. York, 1956, **51**(8): 28.

In preliminary field trials 2 cane varieties were sprayed 4 times, when 4, 6, 8 and 9 months old, with molasses solutions ranging from 10 to 25%, applied at 10 lb. per acre per application. This treatment significantly increased the sucrose content by comparison with untreated canes or canes sprayed with 2,4-D and phenoxyacetic acid.—Indian Inst. Sugar Tech.

2944. Edmond, J. T., Wightman, G. M., and Smith, C. E. M.
The effect of chlorotic streak on B.4362.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 14-17, bibl. 8.

The effects of chlorotic streak on the highly susceptible B.4362 variety are presented with respect to two widely differing localities, germination, incidence of symptoms, juice quality and yield. In the area of light incidence of infection, the hot water treatment would appear to have potential value as a means of control. In the area of high intensity, secondary infection in the field was so great that the value of hot water treatment for the control of chlorotic streak in a highly susceptible variety appears to have little practical value. The disease was shown to affect germination, incidence of symptoms and yield of cane, but in neither locality did it affect juice quality at all. [Authors' summary.]—Jamaica Sugar Estates, etc.

2945. Smith, C. E. M.
Ratoon stunting disease in Jamaica.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 29-32, bibl. 3.

Symptoms of ratoon stunting disease, as reported from Australia, are prevalent in many varieties in Jamaica. In some cases these appear to be associated with soil conditions, but in others, as in the investigations on Co.421 reported here, the symptoms found in sett material have been shown to result in reduced plant cane yields. It has further been shown that the condition can be transmitted by dipping the cut ends of setts in expressed juice from "diseased" material. On the other hand, with some varieties plants grown from "diseased" setts can remain "symptomless" for [illegible] months and perhaps longer. These results suggest that in any survey of ratoon stunting records of the incidence of vascular "symptoms" should be supplemented by an assessment of the reaction of the cane to heat treatment, whether or not it is showing "symptoms".—Res. Dep., Sugar Manuf. Ass. Jamaica.

2946. Farrar, L. L.
A chemical test for ratoon stunting disease of sugarcane.
From abstr. in *Phytopathology*, 1957, **47**: 10.

A colour reaction, indicating the absence of ratoon tunting disease, was consistently given by the application of 3% hydrogen peroxide followed by concentrated ydrochloric acid to nodal area tissue in the region of maximum fibrovascular bundle density.

2947. Steib, R. J., Forbes, I. L., and Chilton, S. J. P.
A report on further studies on the ratoon stunting disease of sugarcane in Louisiana.
From abstr. in *Sugar J.*, 1957, **19**(10): 35-6.

In diseased stalks of C.P.44-101 and C.P.36-105 the disease was eliminated by hot-air treatment at 50° C. for 5 hrs, 52° C. for 4 hrs and 53° and 54° for 1 hr without affecting germination. Hot-water treatment at 50° C. for 2 hrs failed to eliminate the disease in the same two varieties, whereas a 2½-hr treatment was effective for these varieties but not for Q.28. Plant and ratoon yield records for healthy and diseased cane of several varieties showed substantially higher tonnages from the disease-free crops. Cane knives spread the disease rapidly from plants to 1st ratoons; infection increased from 16% to 47% in one case and from 50% to 80–90% in another.

2948. Wehlberg, C.
Ratoon stunting disease in Cuba.
Sugar, N. York, 1956, **51**(3): 27-9, bibl. 15, illus.

Symptoms of ratoon stunting disease were first recognized in Cuba in 1953, and a survey since then has shown the disease to be widespread. Tests have confirmed that the disease can be readily transmitted mechanically from diseased to healthy cane and from cane to *Sorghum vulgare*, and it has been shown that rats may act as vectors. For treatment a steam-heated tank has been designed and is here described with the aid of a diagram. Stalks are lowered into this tank in bundles and held for 2 hours at 50° C. before being cut into setts. The effectiveness of the treatment has been demonstrated by placing diseased stalks in the centres of bundles; in every case stools grown from these stalks have proved healthy.

2949. Antoine, R.
Le traitement des boutures du canne dans la lutte contre la maladie du rabougrissement des repousses. **(The treatment of cane setts for the control of ratoon stunting disease.)**
Rev. agric. sucr. Maurice, 1957, **36**: 31-8, bibl. 4, illus.

The treatment of cane setts for controlling ratoon stunting disease, as practised in Queensland, is described. The reasons why the Americans have adopted the hot-air treatment and the results obtained in the Louisiana hot-air ovens are discussed. The results are given of studies made locally on temperature distribution in both the hot-air and hot-water methods. It is concluded that the latter is preferable, because in practice it is easier to obtain accurate temperature control in hot water than in hot air. The programme proposed for the production of healthy setts is described. [Translation of author's summary.]

2950. Anon.
Hot-water treatment plant at Tully operated by electricity.
Aust. Sugar J., 1956, **48**: 379-80, illus.

A short account is given of an electrically-heated unit operated by the Tully Cane Pest Board. A circular tank holds 1,400 gal. water, which is continuously agitated, and thermostatic control maintains the temperature at 50° C. with a maximum variation of 0·3° C. Bagged cane setts are lowered into the tank in a cage. Electric power costs are only one-fifth of the cost of 14 lb. mercurial dip, which is added to the water as a precaution against pineapple disease.

2951. Chinloy, T.
The effect of organo mercurials on sugar cane setts.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 11-13.

In Jamaica *Ceratostomella paradoxa* is the most serious among several organisms causing decay in cane setts. In 9 trials in different localities untreated setts were compared with setts dipped or soaked for up to 2 mins. in Aretan solutions ranging from 0·25% to 0·5%. In 3 of the trials other organic mercury compounds were also tested. In 8 of the 9 trials the organo-mercurial treatments enhanced germination and also appeared to improve plant vigour. The results suggest that the greatest gain from treatment will be obtained in cane planted in the autumn under wet conditions.

2952. Divinagracia, G. G.
Marasmius stem rot of sugar cane.
Philipp. Agric., 1957, **40**: 469-85, bibl. 8, illus.

Symptoms caused by, and the biology of, *Marasmius sacchari* are described. Control measures recommended are burning the stubble and trash after harvest and cultivation practices which will encourage vigorous growth. Four relatively resistant varieties are recommended. In laboratory tests Orthocide 50 and Dithane D-14 at 2 and 3% inhibited fungus growth.

2953. Chinloy, T.
Small moth borer survey of Jamaica.
J. Jamaican Ass. Sugar Tech. for 1954, **17**: 31-4, bibl. 1.

A survey was carried out during the 1954 crop of infestation by *Diatraea saccharalis*. The method of sampling is described and the percentage of infestation is given for estates, varieties and different cycles of varieties. Differences in infestation between spring plants and various orders of ratoons were negligible, but fall plants were generally more subject to attack. Among B varieties 4362 and 37161 suffered most, 41227 and 42231 were moderately heavily attacked, 34104 was not seriously damaged and 3439 and 37172 suffered least of all. A significant relationship has been found between % borer infestation and % loss in juice quality. For the comparatively low average borer population of 3·4% throughout the island the deterioration in juice quality amounts to 0·77%. This is equivalent to a loss of nearly 1,700 tons sugar, valued at about £50,000, without taking into account losses in weight of cane or volume of juice.—Sugar Res. Dep., Sugar Manuf. Ass. Jamaica.

2954. Box, H. E.
Battle against Venezuela's cane borer. Part I. Preliminary investigations and the launching of a general campaign. Part II. Survey of parasitic colonization and plans for Aragua campaign. Part III. Success of the campaign initiated by Hacienda Santa Teresa.
Sugar, N. York, 1956, **51**(5): 25-7, 30, 45; **51**(6): 34-6, 57-8; **51**(7): 30-4, bibls in text, all illus.

A survey made in the main sugar cane regions of Venezuela during the period 1947–51 showed the average intensity (joint infestation %) of attack by several *Diatraea* species to range from 6 to 120%. The survey was followed by studies on introduced parasites, and an intensive campaign was launched based on repeated liberations of *Metagonistylum minense* [see *H.A.*, 24: 994]. As a result of this campaign the average intensity of borer infestation in 7 haciendas of the Aragua valley has been reduced over 5 years from 16% to 6·3%. This reduction has been accompanied by other benefits, such as reduced disease incidence, the almost complete disappearance of the secondary pest, the weevil borer *Metamasmius hemipterus*, and improved juice extraction and quality.

2955. González Mendoza, R.
Opsiphanes sp., una nueva plaga de la cana de azucar. (***Opsiphanes* sp., a new pest of sugar cane.**)
Agric. trop. Bogotá, 1956, **12**: 747-51, bibl. 4, illus.

A full description is given of the biology of the pest. Larvae were controlled in young cane by emulsifiable aldrin at 2 lb. per ha. of active material or by 1–1½ lb. per ha. of pure dieldrin. For mature cane or for heavy infestations the recommended treatment is 1·2–1·6 lb. per ha. of endrin, applied from the air. All applications should be made in the late afternoon as the larvae are nocturnal.

2956. Prasad, A. R., and Prasad, S. N.
Some observations on the chemical control of the sugarcane top-borer *Scirpophaga nivella* Feb. in Bihar.
Curr. Sci., 1957, **26**: 60-1, bibl. 2.

Newly hatched sugar cane top-borer larvae were released on to healthy plants which were sprayed with DDT, BHC, cryolite, ryania, endrin, dieldrin, aldrin, toxaphene and parathion 12 or 30 hours later. Parathion applied after 12 hours gave the best control, reducing the attack from 52% to 11%. When the applications were made 30 hours after the larvae were released, none of the treatments differed significantly from the control.—Centr. Sugarcane Res. Stat., Pusa, Bihar. J.R.L.

2957. Hughes, R. H.
Sugar losses—field and factory.
Hawaii. Plant. Rec., 1956, **55**: 167-75.

Data show that over the 25-year period 1929–1954 total sugar losses, excluding those due to burning and deterioration caused by delays in milling, have increased by 350% and now amount to an average of about 2 tons pure sucrose per acre. The various factors responsible for this are discussed. Chief among them are the changes that have occurred in harvesting methods, which have led in turn to the introduction of rather inefficient cane cleaning plants. In the factory running old equipment at faster rates has added to the loss.

Tea.

(*See also* 2993h, o, p, u-w, 2994d, e, g, x.)

2958. Wight, W., and Barua, P. K.
What is tea?
Nature, 1957, **179**: 506-7, bibl. 8.

The general definition formulated by the Indian Government, states that tea is made from "plants of *Camellia* genus and *Thea* species". A taxonomic discussion and experimental data presented on some characteristics of *Camellia* hybrids, however, show how difficult it is at present to define the word 'tea' as used in the tea trade and industry. "Must this word be restricted"—the authors ask—"to one species; could it include other species; or should we admit that tea is made from *Camellia sinensis* (L.) O. Kuntze and hybrids thereof?" —Sci. Dep., Indian Tea Ass., Tocklai.

2959. U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
Tea—production and trade.
Foreign Agric. Circ. **FTEA 1-57**, 1957, pp. 5.

The trend of events is shown and discussed. India is now losing ground in her exports to Ceylon and E. Africa. Indonesian production has dropped. New areas in S. America and elsewhere are fast becoming exporters.

2960. GRAHAM, T. G.
Tea growing experiments in north Queensland.
Qd agric. J., 1956, **82**: 669-74, illus.; 1957, **83**: 5-12, illus.

An account is given of investigations, which were started in 1936 when a small area of tea was established by the Bureau of Tropical Agriculture at South Johnstone. Plants have been raised from seed and cuttings, sufficient moisture and shade being necessary in both cases. A hedge up to 5 ft. wide, with the plants closely spaced in the row, has proved to be the most satisfactory planting system. An effective ground cover to reduce erosion and cultivation has been obtained with *Desmodium heterophyllum*. A fertilizer mixture of 15 : 4·5 : 3 has been used for young plants and 2 annual applications of sulphate of ammonia on the older plants. The soil pH is 4·5. A small black beetle (*Rhyparida discopunctulata*) has caused damage to young growth but can be controlled with 0·1% DDT. The tea has been pruned to provide a flat plucking surface at 15, 20 or 30 in. according to the season. Originally the plucking standard was 3 leaves and a bud, but as this did not provide a tea of very good quality 2 leaves and bud plus the third leaf (minus the stem between 2nd and 3rd leaves) has been adopted. Work on mechanical harvesting and manufacture is also discussed. J.R.L.

2961. TEA RESEARCH INSTITUTE OF CEYLON.
Annual Report of the Tea Research Institute of Ceylon for the year 1955, being *Bull.* 37, 1956, pp. 69.

In this report work covered includes: *Chemistry*. Fertilizer trials, soil N cycle in Ceylon tea soils, seasonal variation in soil ammonia and nitrate. *Plant Physiology*. Selection and vegetative propagation, weed killers, banji formation, fish leaf plucking, cultivation and weeding. *Pathology*. Selection for eelworm resistance, and eelworm control. *Mycology*. Blister blight control, observations on wood rot. *Entomology*. Control of scarlet and yellow mites, control of shot-hole borer. *Low-country Sub-station*. Experiments on vegetative propagation, and pruning combined with shot-hole borer control.

2962. INDIAN TEA ASSOCIATION, TOCKLAI.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experimental Station, for 1955, [1956], pp. 159.

Studies are reported on: *Physico-chemical branch:* leaf sprays with sulphate of ammonia, soil studies. *Botanical branch:* studies on illumination and nutrients; practical tea breeding programme. *Agricultural branch:* [see abstract below]. *Plant Pathology branch:* control of root borer (on shade trees), looper caterpillar, bark-eating borer, tea seed bug and red spider mite (effective control by Aramite, Akar 338 and lime sulphur). *Mycological section:* control of black rot, red rust, and eelworms. *Biochemical branch:* chemical changes and moisture loss during withering, volatile constituents in tea. *Engineering development branch:* studies on controlled withering, and on a machine for leaf harvesting and light pruning. *Advisory branches:* trials on spraying, manuring, plucking, shading, pruning with skiffing, and green crops.

2963. LAÍNS E SILVA, H.
Estudos sobre a cultura do chá em Moçambique. (**Studies on tea growing in Mozambique.**) [French and English summaries 4¼ pp. each.]
Estudos, Ensaios e Documentos, Minist. Ultramar Lisboa **22**, 1956, pp. 84, bibl. 31, illus.

Cultural conditions and practices were studied on the Companhia da Zambézia tea plantation in Gurue, at an altitude of 734 m. with a rainy season between December and March and a dry season between May and October. Climatic conditions are recorded in detail, and monthly production is analysed in relation to rainfall and temperature. The type most commonly grown is "Nyasaland mixture tea". Cultural practices are critically reviewed and it is concluded that improvement is needed in methods of pruning, fertilization and soil cultivation. In the author's own experiments on pruning the most economic method was early cutting back of the central portion to 5–10 cm. below the level of the table. The application of 200 kg. sulphate of ammonia per ha. proved beneficial. Cessation of hoeing for 1 year did not reduce yields compared with constant hoeing for the previous 5 years, and a non-cultivation system is recommended to reduce erosion.

2964. NYASALAND.
Annual Report of the Tea Research Station, Mlanje, 1955/56, 1956, pp. 28.

Nursery experiments: The following recommendations are made: (a) minimum stump diameter for planting out $\frac{7}{16}$ in., (b) such stumps are best produced by growing seedlings for 30 months at 6×6 in. square, (c) fertilizer should be applied in the nursery, and (d) the stumps should be shaded by pots after planting out. *Pruning:* In early years short pruning cycles were best for a poor Indian jat tea, but with maturity longer cycles were better. *Tipping:* Various tipping heights, ranging from 2 to 8 in. above the pruning cut had no effect on yield except for the crop lost during the tipping phase. *Fertilizer experiments:* There were indications that the S in sulphate of ammonia was more important to young tea than the N. Increasing rates of sulphate of ammonia up to 120 lb. N per acre resulted in yield increases in mature local jat tea. *Spacing:* Hedge-planted tea at 4 ft. × (2 ft. × 2 ft.) significantly out-yielded all other spacings. *Shading:* In this season, shade caused only a slight increase in yield, and N had more effect than shade on yields.

2965. Indian Tea Association, Tocklai.
Agricultural Branch.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1955, 1956, pp. 45-74.

A brief summary of results from some among many experiments follows: *Three-year pruning cycle:* higher yields at the end of each cycle were obtained with the 2 cycles in which one or two skiffs were introduced, than in cycles without skiffs. *Annual December vs. biennial October prune:* biennial pruning did not consistently increase yield, but teas from unpruned areas were likely to be poorer in quality. *Effect of different nitrogenous manures at different light intensities:* in an experiment involving 4 forms of N at 2 levels there have been no significant differences in yield under 3 light intensities, but yields from 100% and 70% light tended to be higher than from 50%. *Closeness of planting:* yields from hedge planting were higher at first, but the differences disappeared later. *Observations on shade trees:* the growth of *Albizzia stipulata* was poor with 60 lb. K_2O and no P_2O_5, but was good with 60 lb. K_2O plus 20 lb. P_2O_5 per acre. *Preservation of bamboo frames:* the best results were obtained by boiling in 10% copper sulphate solution for 10 minutes.

2966. Mukasa, Y., and Kawai, S.
Studies on nutrient deficiencies in the tea plant grown in water culture (Part 1). Water culture method and the deficiency symptoms of nitrogen, phosphorus, potassium and magnesium. [Japanese, with English summary ¼ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 74-7, bibl. 7, illus.

In the water culture of tea plants it was found necessary to supply oxygen to prevent root rot by renewing the culture solution every 4 days and by adding 3% H_2O_2 to the culture solution every morning and evening. Symptoms of N, P, K and Mg deficiencies were detected, the first two being most distinct. When the plants were deficient in N the leaves became yellowish-green and growth was retarded. When the plants were deficient in P their leaves became darker green, with a smooth surface and formed narrow angles with the stems; the older leaves became yellow at the tip. J.R.L.

2967. Ajdinjan, R. H.
The localization of minerals in the tea plant during their uptake from the soil. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **107**: 741-3, bibl. 6, illus.

During field experiments, lasting 24 hours, it was found that P^{32}, S^{35} and Ca^{45} applied to about ⅛th of the root system of a tea bush, were translocated to a restricted area of branches, indicating that certain roots supply nutrients only to certain branches [see also *H.A.*, 27: 133]. Young tissues contained more of the labelled nutrients than old ones. It is recommended that in young plantations fertilizers should be applied both along and across the rows.

2968. Kawai, S., Ishigaki, K., and Mukasa, Y.
Studies on the behaviour of mineral nutrients in the tea plant (Part 1). Behaviour of phosphorus (P^{32}). [Japanese, with English summary 8 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 78-81, bibl. 2.

In water-culture and field studies on the absorption and distribution of P^{32} in the tea plant it was found that: (a) most of the P^{32} accumulated in the younger leaves and the growing point; (b) the absorption of the P^{32} was affected by the pH of the culture solution and was greatest at pH 5; and (c) more P^{32} was detected in tea plants grown on black than on red soils. [For a preliminary report see *H.A.*, 27: 1948.] J.R.L.

2969. Mukasa, Y., and Kawai, S.
Effects of phosphorus and potassium fertilizers on the chemical components of the tea leaf. [Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 81-4, bibl. 8.

The total N, water soluble N, tannin, caffeine, sugar, Ca, Mg, K and P contents were determined in samples of old leaves and young leaves harvested in the first and third plucking seasons from tea plants which had received the same fertilizer treatments for 12 years. The treatments were complete fertilizer, without K, without P, and without K and P. There was no difference in the growth of the plants, but there was more P and K in the soil and leaves of bushes in plots which had received these elements. There was less Mg in the old leaves from plots which had received K. Total N was higher in the old leaves, but lower in the young leaves, of plants supplied with K. The tannin content of young leaves was larger without P at the first plucking but without K later. The caffeine content was greater in the older leaves if no K had been applied, but was greater in the young leaves where no P was used. The reducing sugar content of the older leaves was highest with no K but in the young leaves this applied only to the third plucking round, and in the first plucking the content was highest with no P. J.R.L.

2970. Kawai, S., Ishigaki, K., and Takayanagi, H.
Variation of mineral contents of leaves at different positions on the stem of the tea plant. [Japanese, with English summary 8 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 85-8, bibl. 2, illus.

The leaves on the upper part of the stem were found to contain more P, K and Mg, but less Si, Ca, Fe and Mn, than those lower down. The S content did not vary. Leaves harvested in the first and third plucking seasons showed similar trends. J.R.L.

2971. Harada, S., and others.
Studies on photosynthesis of the tea plant (Part 1). On the apparatus for measuring the CO_2 exchange and some data on the assimilation rate of the tea plant. [Japanese, with English summary ¼ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 6-10, bibl. 4, illus.

Apparatus is described which can be used to measure the rate of photosynthesis of a plant. The CO_2 taken up by the plant is determined by measuring the electrical conductivity of the absorbing solution with an impedance bridge and then calculating the amount from a calibration chart. With this apparatus the authors have studied the diurnal changes in the rate of C assimilation of the tea plant and have found that the light saturation point seems to be within the range of 0·6 to 0·8 cal./min./sq. cm. J.R.L.

2972. Torii, H.
Estimating the "Debiraki-day" of the tea shoot. [Japanese, with English summary 10 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 1-5, bibl. 2.

"Debiraki-day" is defined as the last day upon which all the leaves plucked are of the pekoe grade. It appears to be influenced by the average daily temperature from the end of March onwards, particularly until mid-April. "Debiraki-day" can be estimated from a regression equation using the average daily temperature during the spring. J.R.L.

2973. Dutta, S. K.
Results of pruning experiments.
Two and a Bud, 1956, 3(4): 3-9.

The results and conclusions drawn from over 24 pruning experiments carried out at Tocklai and Borbhetta since 1920 are summarized. Medium pruning on healthy bushes in December has proved the most satisfactory treatment giving the most vigorous bushes with the highest yields. Top pruning experiments have shown that bushes should not always be pruned at the same height or knotty growths occur, and that there is no benefit from leaving too much wood during the ordinary top prunes. Biennial pruning did not produce significantly higher yields than annual pruning but higher second flush and lower main crop yields were obtained. In one experiment where 3 different 3-year pruning cycles were compared with annual pruning, two of the cycles, which included one or two skiffs in each cycle, produced more tea over the 6-year period than did annual pruning, but the third method, involving lighter pruning showed a slight loss over the same period. J.R.L.

2974. Macalpine, R. I.
Practical pruning in relation to kind of tea and environment.
Two and a Bud, 1956, 3(4): 17-20.

The pruning system must be adapted to local climatic and soil conditions, it must also vary with the jat of tea planted, since this governs the "recovery potential" that the plant has to pruning. This is greatest with China types of tea and least with Assam. J.R.L.

2975. Sarmah, K. C.
Some pathological considerations related to pruning.
Two and a Bud, 1956, 3(4): 13-16.

It is stated that, depending on environmental, cultural and physiological conditions, certain types of pruning often bring pathological disorders in their wake. An account is given of the diseases connected with severe pruning and centering of young tea, and the relationship between pruning and attacks by red spider, red rust, black rot and blister blight and the effects of drought are discussed. J.R.L.

2976. Barua, D. N.
Some physiological aspects of pruning.
Two and a Bud, 1956, 3(4): 10-12.

Pruning is essential to maintain the tea bush in a productive state, but this cannot be done unless there is a sufficient store of carbohydrates in the roots. This reserve can be built up by leaving sufficient leaves when tipping and, if necessary, by resting the plant for a while before pruning. Pruning does not appear to have any detrimental effect on the growth of absorbing roots. J.R.L.

2977. Voroncov, V. V.
The dying off of the feeder root system in the tea plant. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1956, **21**(12): 22-4, bibl. 5.

Studies at Čakva (near Batum) have shown that the weight of active roots of 1-year-old tea seedlings was 12·3% lower in February than in the previous December, and that of 2-year-old seedlings and mature bushes 13·1–13·2% lower. By the end of March or early April new root growth had more than compensated for these losses and from then on the amount of active roots increased. In mature plants the percentage of dead roots to the total amount of roots at a depth of 30–50 cm. was 4·3 in August, 4·2 in October, 5·3 in December, and 9·3 in February. The dying off of roots is considered to be a normal process comparable to leaf drop.

2978. McTear, I.
Mechanical harvesting of tea.
Dutta, S. K.
The effect of mechanical harvesting on the tea crop.
Two and a Bud, 1956, 3(3): 3 and 4-6.

In the first article a prototype machine, which has been used for harvesting tea, is briefly described. In two seasons' harvesting by this machine about 15% of the crop plucked has not been suitable for manufacture. The agitation of the bushes by the machine caused some branches and older leaves to be pushed up to the cutters. The frames of mechanically harvested bushes were not harmed. Obstacles to mechanical harvesting are discussed.

2979. S[armah], K. C., and G[lover], P. M.
Control of primary root diseases of tea.
Ser. Tea Res. Inst. Tocklai **70/1**, 1955, pp. 8.

The commonest primary root diseases of tea in Assam are charcoal stump rot (*Ustulina zonata*=*U. deusta*), brown root rot (*Fomes lamaoensis*=*F. noxius*) and tarry root rot (*Hypoxylon asarcodes*). The symptoms and mode of spread of these and of several secondary root diseases are described, together with measures recommended for their prevention and eradication.

2980. Sarmah, K. C.
A note on the use of *Stylosanthes guyanensis* Sw. var. *gracilis* (H.B.K.) Vog. in relation to black rot disease of tea.
Two and a Bud, 1956, **3**(4): 21.

"Stylo" or "Brazilian lucerne" has been used in some areas as a ground cover in young tea plantations, but it has now been discovered that it is very susceptible to black rot and can serve as a source of infection to young tea. Caution in its use is therefore recommended. J.R.L.

2981. Jayaraman, V., and Venkataramani, K. S.
Control of blister blight of tea in southern India—the 1956 field trials.
Plant. Chron., 1957, **52**: 35-9, bibl. 12.

The results are summarized of 3 experiments in which a large number of fungicides were compared. In general, fungicides based on 50% copper were superior to non-copper fungicides, there being no difference between copper oxide and oxychloride formulations. Flit 406 (captan) at 8 oz./10 gal. water afforded protection equal to that of 50% copper at 4 oz./10 gal., but weaker concentrations of Flit 406 were not effective. Wettable formulations of low copper content (8% or less) did not give such good control as 50% copper fungicides, but 20% colloidal copper showed promise and deserves further trial.—U.P.A.S.I. Tea Exp. Stat.

2982. Kibushi, H., and Ezuka, A.
Control of tea blister blight with various fungicides (Part 1). [Japanese, with English summary 7 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 26-30, bibl. 17.

The results of 2 years' spraying trials against blister blight (*Exobasidium vexans*) have shown that it can be effectively controlled by 3 sprays of a bordeaux type or by Cupravit but that Dithane Z-78 [zineb] and karathane are less effective. J.R.L.

2983. de Weille, G. A.
De fungicide werking van licht van verschillende golflengten ten aanzien van blister blight. **(Fungicidal action of light of different wavelengths against blister blight.)** [English and Indonesian summaries 8 and 11 lines.]
Bergcultures, 1957, **26**: 149-57, bibl. 14.

Ultraviolet light (chiefly 2537 å) had a marked fungicidal effect on spores of blister blight. The highest number of spores was killed after treatment for 45 min. —Alg. Proefst. AVROS, Medan.

2984. Anon.
Red spider—control.
Addendum Ser. Tea Res. Inst. Tocklai **71/1**, 1956, 1 p.
Das, G. M., and Glover, P. M.
Toxicity of pesticides.
Two and a Bud, 1956, 3(4): 22.

The recommendation made in the original serial [see *H.A.*, 26: 2293] regarding the use of Aramite 15W and Akar 338 is withdrawn until tolerance limits have been settled. These acaricides can be used on non-plucking tea, tea nurseries and tea seed baries but not on tea in plucking.

Sundry crops.

(*See also* 2358, 2659, 2829, 2831, 2993d, t, 2994c, 2995r.)

2985. Khandige, S. B., Balakrishna, N., and Adyanthaya, N. R.
Some facts about arecanut.
Arecanut J., 1956, **7**: 29-33.

The Arecanut Research Station at Vittal, South Kanara, came into being about 3 years ago with the acquisition of a 34-year-old areca palm garden. The cultural methods adopted and records taken are summarized with respect to seednut selection, planting, leaf fall and flowering, cultivation, manuring and irrigation, and harvesting, curing and yields. Maintenance costs and returns are tabulated.

2986. Raghavan, V., and Baruah, H. K.
On certain aspects of the morphology of arecanuts (*Areca catechu* Linn.).
Arecanut J., 1956, **7**: 21-8, bibl. 11.

Following notes on the morphology of the palm the fruit characters are described for different types of arecanut found in Assam. In all, 9 groups have been distinguished based on variations in fruit size and shape.—Dep. Bot., Gauhati Univ., Assam.

2987. Ledin, R. B.
A comparison of three clones of Barbados cherry and the importance of improved selections for commercial plantings.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 293-7, bibl. 18, illus.

Three clones of Barbados cherry have been under field observation since 1949 at the Florida Sub-tropical Experiment Station. The most outstanding is a semi-sweet clone, and it is proposed to name this selection "Florida Sweet Barbados cherry". Taxonomic studies are in progress to determine whether the correct scientific name is *Malpighia punicifolia* or *M. glabra.*

2988. Nelson, R. O., and Goldweber, S.
Further rooting trials of Barbados cherry.
Proc. Fla St. hort. Soc., 1956, 1957, **69**: 285-7, bibl. 7.

In rooting trials with Barbados cherry (*Malpighia glabra*) concentrations between 2·5 and 10 mg./ml. of IBA gave satisfactory rooting percentages. It is suggested that IBA, applied at a concentration of 5 mg./ml. by the quick dip method, may be safely used and will promote extensive rooting in most clones of Barbados cherry. It is recommended that the cuttings should be 5 to 8 in. long, with a diameter of not less than ¼ in.—Univ. Miami, Coral Gables, Fla.

2989. Pesquiza, L. C.
Influence of different soil media on growth of rambutan seedlings.
Philipp. Agric., 1956, **40**: 146.

Rambutan seedlings grew better in a 1 : 1 : 1 mixture of fine river sand, rice straw compost and ordinary garden soil than in any of these components separately.

2990. OTANES, R. T., AND RUIZ, T. P.
Propagation of rimas [breadfruit] by root cuttings.
Araneta J. Agric., 1956, **3**(2): 56-66, bibl. 5.

In trials with root cuttings, 6 in. long, the best results (52% and 36% strike) were obtained with hardwood material, 2·5–4·75 cm. in diameter, and semi-hardwood material, 1·75–2·45 cm. in diameter, planted at the beginning of the rainy season in the open in 4–6 in. of river sand overlying dug soil. Planting during the dry season and the use of softwood and terminal root cuttings gave less satisfactory results.

2991. RAO, V. N. M., AND HASSAN, M. V.
Variations in the seed characters of cashew (*Anacardium occidentale* L.).
Indian J. agric. Sci., 1956, **26**: 211-16.

Weights, measurements and shelling percentages are tabulated for 100 samples of cashew seeds collected from India and other countries. The wide variations found indicate the need for selecting and propagating vegetatively those types which possess the most desirable economic characters.—Centr. Cashewnut Res. Stat., Mangalore.

2992. GARCÍA PITTMANN, E.
La chirimoya (*Annona cherimola* Mill). **(The cherimoya.)** [English summary ⅓ p.]
Circ. Estac. exp. agric. La Molina, **71**, 1956, pp. 26, bibl. 31, illus.

Notes are given on botany, climatic and soil requirements, propagation, planting, pruning, fertilizers, irrigation, and pest and disease control. Trials have shown that artificial pollination results in much better fruit set and larger, more perfect fruit. The use of pollen from *Annona senegalensis* has proved very satisfactory. Some of the varieties of cherimoya collected in northern Peru and grown at La Molina for breeding purposes are described.

Noted.

2993.

a ANON.
Developing the cacao industry of Suriname.
Meded. LandbProefst. Suriname **20**, 1956, pp. 14.
A general survey of conditions and measures taken to revive the industry.

b ANON.
German Institute for Tropical and Semi-Tropical Agriculture.
Gordian, 1957, **56**(1349): 17-19.
Reopened for students January 1957.

c ANON.
L'oïdium de l'hevea. **(Hevea mildew.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 41-5, bibl. 4, illus.
Notes on symptoms and control with sulphur.

d ANON.
The cashew industry in the Eastern Region.
Nigeria Trade J., 1957, **5**(1): 16-17.
Progress is encouraging.

e ARANGO B, H.
La sigatoka del banano, *Cercospora musae* Zimm. **(Leaf spot of bananas, *Cercospora musae*.)**
Acta agron. Palmira, 1956, **6**: 159-72, bibl. 15.
A review.

f BAKSHI, J. C., AND BAJWA, B. S.
Identification of some mango varieties in the nursery stage.
Indian J. Hort., 1957, **14**: 47-52, bibl. 9.
Leaf characters of 6 varieties described.

g BAVER, L. D.
Cane mechanization in Hawaii.
Int. Sugar J., 1956, **58**: 61-5, illus.
Notes on cultivating, planting, spraying, harvesting and haulage machines.

h BOKUČAVA, M. A., AND SKOBELEVA, N. I.
A study of volatile aldehydes in tea. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **112**: 896-8, bibl. 7, illus.
Quantitative determinations during different stages of manufacture.

i BROATCH, J. D.
Problems of cocoa growing in the Gold Coast.
New Gold Cst Fmr, 1956, **1**: 2-5, 42-4, illus.
Progress reviewed and main problems discussed.

j CABAL CONCHA, A.
Biológia y control del gorgojo del café: *Araecerus fasciculatus* De Geer, fam.: Anthribiidae, en Barranquilla, Colombia. **(Biology and control of the coffee weevil *Araecerus fasciculatus* at Barranquilla, Colombia.)**
Rev. Fac. nac. Agron. Medellín, 1956, **18**(49): 49-72, bibl. 21, illus.
Biological and chemical control of the pest in stored coffee reviewed.

k CHONA, B. L.
Sugarcane smut.
Indian Fmg, 1956, **6**(9): 27-33, illus.
A brief review, including varietal resistance and control measures.

l COGNARD, A.
La palmeraie du Dahomey. **(The oil-palm zone of Dahomey.)** [English summary 1 p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 91-8.
Soils, climate, cultural methods and their improvement.

m CRAMER, P. J. S.
The rubber production in the Dutch East Indies.
Arch. Rubb. Cult. Bogor, 1956, **33**: 259-344, bibl. 92.
Up to 1940.

n Cuillé, J., and Guyot, H.
Fungicidal treatment of banana plantations.
Tech. Inf. Circ. S. Pacific Commiss. **18**, 1956, pp. 51, bibls.
Translation of French papers [see *H.A.*, 25: 995, 996 and 3254 and 26: 4134].

o D[as], G. M.
Ants and their nests.
Ser. Tea Res. Inst. Tocklai **112**, 1956, pp. 3.
In tea, and their control with chlordane and dieldrin.

p D[as], G. M.
Compatibility of insecticides, acaricides and fungicides commonly used in tea.
Ser. Tea Res. Inst. Tocklai **110**, 1956, pp. 2.

q Dauphin-Meunier, —.
Les plantations d'hévéas au Cambodge et au Sud-Vietnam. **(Rubber plantations in Cambodia and South-Vietnam.)**
C.R. Acad. Agric. Fr., 1956, **42**: 852-61.
History and present situation in growing and research.

r van Dinther, J. B. M.
Insects of the coconut palm in Suriname.
Bull. LandbProefst. Suriname **69**, 1956, pp. 27, bibl. in text, illus.
Descriptions, biology and control of 20 species.

s Dutt, N. L.
World collection of sugar canes established at Coimbatore.
Int. Sugar J., 1956, **58**: 153-5.
Collection started July, 1955, and its objectives.

t Dutta, S.
Cultivation of jack fruit in Assam.
Indian J. Hort., 1956, **13**: 189-97, bibl. 11.
Varieties, propagation, cultivation, and pests and diseases.

u D[utta], S. K., and G[lover], P. M.
Pruning of young tea (Assam kinds).
Ser. Tea Res. Inst. Tocklai **10/2**, 1956, pp. 5.

v D[utta], S. K., and G[lover], P. M.
Shade.
Ser. Tea Res. Inst. Tocklai **46/1**, 1956, pp. 5.
Effects of shade and N on tea and notes on 9 shade trees.

w Ezuka, A.
Ecological studies on blister blight and Japanese *Exobasidium* blight of tea (Part 1).
[Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1956, No. 15, pp. 13-25, bibl. 12, illus.
E. vexans amd *E. reticulatum* as affected by temperature and humidity.

x Federer, W. T.
A method for evaluating genetic progress in a sugar cane breeding program.
Hawaii. Plant. Rec., 1956, **55**: 177-89, bibl. 11.
Statistical procedures for a single test and for several tests.

y Foster, C. B.
The yield of sugar cane in Barbados in 1955.
Bull. Barbados Dep. Sci. Agric. **22**, 1955, pp. 21 [received 1957].
Ground covered similar to last survey [*H.A.*, 25: 3322].

z Gallego M., F. L.
El picudo o taladrador del plátano y del abacá, *Cosmopolites sordidus* (Germar, 1824). **(The banana and Manila hemp borer, *Cosmopolitus sordidus*.)**
Rev. Fac. nac. Agron. Medellín, 1956, **18**(50): 65-72.
Control by soil applications of aldrin or by cultural measures.

2994.

a García Lozada, L.
Un primer ensayo de maduración controlada en caña de azúcar. **(A preliminary investigation on controlling maturation in sugar cane.)**
Sugar—Azucar,* 1957, **52**(3): 52-3, 71, bibl. 1.
Technique of sampling for sheath moisture content for irrigation control in Venezuela.

b Garg, M. L.
Mangoes every year.
Indian Fmg, 1956, **6**(9): 14-15.
A monthly irrigation and manurial programme to correct biennial bearing.

c Gerin, L.
Les *Helopeltis* (Hemipt. Miridae), nuisibles aux quinquinas du Cameroun français. **(*Helopeltis* species attacking cinchona in French Cameroons.)**
J. Agric. trop. Bot. appl., 1956, **11**: 512-40, bibl. 23, illus.
DDT and BHC at 0·1% have given good control.

d G[lover], P. M., D[utta], S. K., and M[acAlpine], R. I.
Silviculture of shade.
Ser. Tea Res. Inst. Tocklai **111**, 1956, pp. 4.
Seed collection and treatment, and planting out for tea.

e G[lover], P. M., and W[ight], W.
Care and maintenance of tea seed baries.
Ser. Tea Res. Inst. Tocklai **22/1**, 1956, pp. 4.
Spacing and care of tea grown for seed.

f Goonewardene, H.
Stem bleeding of coconuts.
Ceylon Coconut Quart., 1955, **6**: 89-96, illus., [received 1957].
A review, with special reference to *Ceratostomella paradoxa* and its control.

g Harler, C. R.
The mechanical harvesting of tea leaf.
World Crops, 1957, **9**: 154-8, illus.
Methods, machines and problems discussed.

---

* Formerly *Sugar, N.Y.*, now incorporating *El Mundo Azucarero*.

h Hartley, C. W. S.
Oil palm breeding and selection at WAIFOR. [French summary 1 p.]
Bull. agron. Fr. d'out. mer, 1956, No. 4, pp. 31-6.
Oil palm breeding and selection in Nigeria.
J. W. Afr. Inst. Oil Palm Res., 1957, **2**: 108-15, bibl. 4.
Outline of history and present programme.

i Indian Coffee Board.
Coffee Statistics relating to India, 1954-55, being *15th Annual Report of the Indian Coffee Board, Bangalore (1954–55)*, Vol. **3**, pp. 264, R. 2-12-0.
Acreage, production and marketing figures.

j Laíns e Silva, H.
Número de cromosomas em café. (**Chromosome number in coffee.)**
Rev. Café portug., 1956, **3**(11): 5-10, bibl. 26.
And stomatal frequency in *Coffea* spp. and hybrids.

k Lefort, E. J. E.
Economic aspects of the coconut industry in the South Pacific.
Tech. Pap. S. Pacific Commiss. **92**, 1956, pp. 20, bibl. 32, illus.
With suggestions for increasing productivity.

l López A., M., and Calle V., H.
Valor comparativo de la pulpa de café descompuesta como abono. (**Comparative value of decomposed coffee pulp as fertilizer.)**
Bol. inf. Café Chinchina-Caldas, 1956, **7**: 285-97, bibl. 8.
A good source of K, Ca and Mg.

m Miller, E. V.
More and better sugar cane with fertilizers.
Sugar J., 1957, **19**(8): 24-5.
General recommendations for plants and ratoons.

n Nirula, K. K.
Investigations on the pests of coconut palm. Part III. *Nephantis serinopa* Meyrick.
Indian Coconut J., 1956, **9**: 101-31, illus.
Description, life history, parasites and predators, and factors affecting outbreaks.

o (Pereira, J.)
Processo de desgomagem rapidá do café despolpado para melhoria da bebida. (**Process for rapid removal of mucilage from coffee beans for improvement of the beverage.)**
Fôlha da Manhã 9 June, 1956, from abstr. in *Bol. Super. Serv. Café, S. Paulo*, 1956, 1956, **31**(352): 28.
By activation of natural enzymes.

p Pichel, R.
L'amélioration du palmier à huile au Congo belge. (**Oil-palm improvement in the Belgian Congo.)** [Flemish summary 1¾ pp.]
Bull. agric. Congo belge, 1957, **48**: 67-76.
Selection from *tenera*, *dura* and *pisifera* described.

q Pousa Bicudo, L.
Café e geada. (**Coffee and frost.)**
Bol. Super. Serv. Café, S. Paulo, 1956, **31**(351): 7-12.
Protective measures discussed.

r Pronk, F.
Some impressions of oil palm cultivation in Africa.
Neth. J. agric. Sci., 1957, **5**: 55-60.
Nigeria, Belgian Congo and Ivory Coast.

s Radha, K., Nirula, K. K., and Menon, K. P. V.
The muscardine disease of *Oryctes rhinoceros* L. II. The causal organism.
Indian Coconut J., 1956, **9**: 83-9, bibl. 9.
Studies on *Metarrhizium anisopliae*; part I is noted in *H.A.*, 27: 951h.

t Ramp, R. M.
Sugarcane planter progress report for 1956.
From abstr. in *Sugar J.*, 1957, **19**(10): 37-8.
Improvements to 2-row planter and planting tests described.

u Roberts, E. J., and Martin, L. F.
Quantitative determination of the amino acids of sugar cane juice.
Sugar, N. York, 1956, **51**(1): 32-3, bibl. 20.
16 amino acids, including 3 not previously recorded in cane juice.

v Rocha de Medina, A. E.
Necessidades de mão de obra na cultura do café. (**Labour requirements in coffee growing.)**
Rev. Café portug., 1956, **3**(12): 5-14.
Data apply to arabica and robusta coffee in Angola.

w Roy, J.
Situation du palmier à huile en Guinée. (**Status of oil palms in French Guinea.)** [English summary ¾ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 120-5.
Over-exploitation of old groves and successful rehabilitation.

x S[armah], K. C., and G[lover], P. M.
Thread blight.
Ser. Tea Res. Inst. Tocklai **42**/**2**, 1956, pp. 3.
And its control by pruning and spraying.

y Service de l'Agriculture de la Côte d'Ivoire.
Les travaux d'aménagement et d'extension de la palmeraie naturelle de la région de Dabou (Côte d'Ivoire). (**Organization and extension of the natural oil-palm grove at Dabou, Ivory Coast.)** [English summary 1 p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 111-19.

z Service de l'Agriculture du Togo.
La palmeraie du Togo. (**Togo oil-palm groves.**) [English summary ¾ p.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 99-110.
Practices, production and improvements.

2995.

a Sethi, A. S., and Kartha, A. R. S.
Oil distribution in different parts of the coconut kernel.
J. sci. industr. Res. India, 1956, **15B**: 105-6, bibl. 14.
Found to increase from innermost to outermost layers.

b Sharma, S. L., and Jha, J. N.
"Spike" (a new) disease of sugarcane.
Proc. Indian Acad. Sci. Sect. B, 1957, **45**: 16-20, bibl. 5, illus.
Symptoms of a stunting disease; cause not yet known.

c Shaw, H. R.
The cane plant and water. Part I: Established relationships between soil plant and water. Part II: Relationships requiring further investigation.
Sugar, N. York, 1955, **50**(8): 29-31, illus., and **50**(9): 39-42, bibl. 21, illus. [received 1957].
Relationships reviewed and discussed with special reference to sprinkler irrigation.

d Shaw, H. R.
Scientific tools for irrigation.
Sugar, N. York, 1955, **50**(12): 31-3, 36-7, bibl. 23, illus. [received 1957].
Equipment for determining efficiency and frequency of irrigation applications to cane.

e Sheffield, F. M. L.
Ratoon stunting—a degeneration disease of sugar cane.
E. Afr. agric. J., 1956, **22**: 70-2, bibl. 10.
A review, with suggestions for producing clean plantations.

f Smith, C. E. M.
Review of the variety situation.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 3-10.
In Jamaica B.41227, B.42231 and B.4362 have largely replaced B.34104, etc.

g Smith, N. M.
N.Co.310 in Bundaberg area.
Cane Grs' quart. Bull. 1957, **20**: 73-5, illus.
Report on Australian experiments with N:Co.310.
S. Afr. Sugar J., 1957, **41**: 203-5.
Promising results in commercial trials.

h Spoon, W.
Onderzoek van Surinaamse cacao in het laboratorium. (**Laboratory studies of cacao from Surinam.**) [English summary ½ p.]
Surinaam. Landb., 1956, **4**: 202-7, bibl. 12.
Analyses of bean samples from young cacao fields.

i Steindl, D. R. L.
***Sclerophthora* disease at Proserpine.**
Cane Grs' quart. Bull., 1957, **20**: 91-2, illus.
On poorly drained land; variety resistance trial started.

j Suárez de Castro, F.
Fertilizantes químicos para el cafeto. (**Chemical fertilizers for coffee.**)
Rev. cafet. Colombia, 1957. **13**(130): 17-26, bibl. 23.
A review, emphasizing importance of K and yield-reducing effects of excess P.

k (Telles, J. de Q.)
Existiriam, em todo mundo, 6.370.000.000 de cafeeiros. (**The world total of coffee trees is 6,370,000,000.**)
Diário de S. Paulo, 4 Sept. 1956, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1956, **31**(356): 47-8.
Trees tabulated by countries, half being in Brazil.

l Thompson, H. A., and Floyd, F. J.
Notes on the use of gypsum resistance cells as applied at Monymusk in the study of irrigation control.
Irrigation studies at Monymusk with particular reference to the use of gypsum resistance units.
J. Jamaican Ass. Sugar Tech. for 1952 and 1953, **16**: 25-30, illus., and *Ibid. for 1954*, **17**: 10-18.
Apparatus and its use for sugar cane irrigation discussed. [See also *H.A.*, 26: 4222.]

m Tichit, M
L'amélioration des palmeraies naturelles de la zone littorale du Cameroun. (**Improvement of natural palm groves in the coastal region of the French Cameroons.**) [English summary 1¼ pp.]
Bull. agron. Fr. d'out. mer, 1956, No. 14, pp. 76-90.
Present conditions and plans for improvement and extension.

n Toohey, C. L.
A new variety—Q.61.
Cane Grs' quart. Bull., 1957, **20**: 76-7.
Characteristics and performance of Q.61, formerly H.6 (P.O.J.2878 × Co.290).

o Tryon, M.
Natural and synthetic rubbers.
Analyt. Chem., 1957, **29**: 714-21, bibl. 162.
Biennial review of physical and chemical methods of analysis.

p U.S. Department of Agriculture, Foreign Agricultural Service.
Cocoa beans, world production and trade.
*Foreign Agric. Circ. FCB***4-56**, 1956, pp. 30.

q Vaidyanathan, L. V., Cokkanna, N. G., and Narayanan, B. T.
Leaf-symptoms of biuret toxicity in coffee.
Indian J. Hort., 1956, **13**: 163-4, bibl. 4, illus.
Chlorosis in seedlings watered with fertilizer-grade, granulated urea solution.

r Venkatakrishniah, N. S.
Anabe roga of coconut and arecanut palms caused by *Ganoderma lucidum* and its eradication.
Mysore agric. J., 1956, **31**: 227-31, bibl. 6, illus.
Symptoms, killing and removal of infected trees, and sulphur dust treatment of soil.

s Wightman, G. M.
Determination of fibre in canes.
J. Jamaican Ass. Sugar Tech. for 1955, **18**: 43-4.

NOTES ON BOOKS AND REPORTS.

Books.

996. Börner, C., and others. (Editor, Blunck, H.)
Handbuch der Pflanzenkrankheiten, Band V. Tierische Schädlinge an Nutzpflanzen, 2. Teil. Lieferung 4. Homoptera II. Teil.
(Handbook of plant diseases, Vol. V. Pests of cultivated plants. Part 2: Sect. 4. Homoptera, Part II.)
Paul Parey, Berlin and Hamburg, 1957, 9½×6½ in., pp. 577, bibls numerous, illus., DM. 147.

i is 25 years since the last edition of Sorauer dealt with e aphids and coccids. The increased attention paid these groups from the taxonomic and virus stand-nts since 1932 is reflected in their now being given whole volume of nearly 600 pages to themselves, inst 200 pages in 1932.

e aphid section has been entirely rewritten, and its ue greatly enhanced. The classification followed is at of Börner's 1952 "Europae centralis Aphides", but th the inclusion of the principal species of economic portance in other regions. Particularly valuable to applied entomologist are the keys given before the eatment of each subdivision, and the notes given under ecies about proved virus vector capacity and methods control. To the taxonomist a welcome feature is at biological and experimental details are often given ore fully than in Börner's work. Taxonomically and omenclaturally many criticisms may be made, but this eview is not the place for most of them. Those urtured on the nomenclature of Hille Ris Lambers ill find unfamiliar applications of such generic names *Aulacorthum*, *Metopolophium* and *Nectarosiphon*; ey will look in vain for *Aulacorthum solani* (*solani* itb. is treated as a homonym of the now invalidated *lani* Kittel, which is used for *Macrosiphum solanifolii* shm.); and they will perhaps ask why *Myzus ascaloni-s* is now a *Rhopalomyzus*. Some attributions of ecies to genera seem to have been made without eference to material of the *typus generis* (e.g. *bonomii* .R.L. to *Debilisiphon* Shap.) or to the original escription (e.g. *Pemphigus dauci* Goureau which is a *ysaphis*). The illustrations, which are taken from her works, are mainly of adequate quality; but it is rd to understand the selection of so poor a figure as o. 28 (*Schizaphis graminum*), while some of the more eavily stippled or hatched figures (e.g. 31, 40, 41, 50) ve not stood reproduction well. Fig. 46 perpetuates major error in Balachowsky & Mesnil, since the aphid figured as a fundatrix of *Sappaphis reamuri* is obviously a species of *Aphis*! There are a few misprints and *lapsus* of an unfortunate kind: *Brachyaphis* for *Bradyaphis* (p. 80), Brasswood for Basswood (p. 86), *lagarriguei* for *mimeuri* (*lagarriguei* Rem. is an *Ericaphis*) (p. 157) and Marshall for Marchal (p. 313) stand out. Apart from such minor criticisms this will be an essential reference work for many years to come.

Over the past 25 years coccid taxonomy has been fundamentally revised by Ferris and Morrison and their respective schools in the U.S.A., by Borkhsenius in the U.S.S.R., Hall in England and Balachowsky in France. It is a pleasure to find that, in extending the coccid section from 34 to 117 pages, the authors have adopted the new systems of classification throughout; and although there are some inaccuracies (*Parlatoria ziziphus* (Lucas) given as *P. ziziphi* Luc. on p. 501, for example) these are of minor importance. The inclusion of Commonwealth Institute Distribution Maps (pp. 479, 481, 483) is particularly welcome. There are unfortunately rather incomplete lists of natural enemies given for each of the major pest species. Only one predator (*Paragus marshalli* Bezzi), for instance, is given for *Orthezia insignis* Browne; at least six enemies are known. One parasite of *Pseudococcus njalensis* Laing is named, when at least 13 are known. In the paragraphs on chemical control much space is devoted to HCN fumigation, light oils and DDT; the organophosphorus compounds are scarcely mentioned. More space could profitably have been given to De Bach's work in the general discussion of control techniques on pp. 410–14. These are again minor criticisms and do not detract from the great value of the coccid section as a standard reference work of lasting importance.

H.L.G.S.
A.H.S.

2997. Bowman, F. T.
Citrus-growing in Australia
Angus and Robertson, Sydney, London, Melbourne, Wellington, 1956, 8½×5½ in., pp. 311, bibl. 7 pp., illus., 63s. (sterling).

"The editor" of the *Australian Agricultural and Livestock Series*, to which this book belongs, has "laid down as guiding principles that the text should be concise, Australian in treatment, and, while incorporating the findings of the latest research, practical in outlook". So writes Dr. Bowman in his preface and then proceeds to do exactly what the editor asks in producing the first general reference book on citrus growing in Australia.

Following a brief history of the industry he devotes three chapters to the complexities of varieties, species and hybrids, to the selection of varieties and rootstocks, and to methods of propagation. Between them these chapters cover such matters as bud sports and nucellar seedlings, virus and other diseases, and the effects of different rootstocks on tree growth and fruit quality. From nursery practices Dr. Bowman passes on to a consideration of climatic, soil and other factors which govern the choice of districts for planting citrus and then to the selection, design and development of a site with emphasis on the layout of drains and irrigation systems. Planting, both in straight rows and on the contour, is described, and a whole chapter is devoted to the development and care of young trees up to bearing age.

The six remaining chapters concern the management of bearing groves. They include recommendations on nutrition with descriptions of symptoms of mineral deficiency and toxicity, soil management, irrigation, and pest, disease and frost treatments. A chapter on pruning lays particular stress on methods of renovating older trees, and another on cropping discusses flower and fruit development and means of reducing fruit drop. The final chapter deals with harvesting and with the preparation of fruit for market.

For a textbook designed for use by students and by growers, large and small, the sequence outlined above is admirable. The story is told with clarity, although with a degree of conciseness amounting almost to terseness in some places. The results of Australian research up to 1955 are incorporated in so far as they have a practical application, but experience obtained in other countries is used only to fill in gaps in knowledge.

The book, which is well printed and illustrated, provides the Australian citrus grower with a standard work which will be of value for many years to come. The grower in other countries, who makes allowance for its regional approach, will also find that it contains much information of interest. The price may seem high, but the diet is concentrated. G.K.A.

2998. CHANDLER, W. H.
Deciduous orchards.
Henry Kimpton, London, 3rd edition, 1957, 9½×6 in., pp. 492, bibl. 527, illus., 56s.

The author has not wasted his time since the second edition of this most useful of manuals appeared in 1951 [see *H.A.*, 21: 4086], but has kept up to date with modern developments in pomological research by concentrated reading.

The further knowledge thus acquired is put at the disposal of the reader in this new edition. Sensibly the author has left the construction and general outlay of his work unchanged, but where new discovery has impinged on old findings he has managed very skilfully to introduce the more modern findings without making his manuscript top heavy or contradictory. As was noted by the reviewer of the 2nd edition, Chandler is international in his outlook. As a result the book is suitable both for the American and European student of pomology, whether he is still at the University preparing to take exams or in the field preparing to grow fruit commercially.

In his preface to this edition the author tacitly admits the impossibility of including references to all the new literature since 1951. He has therefore merely chosen papers in the foremost horticultural, physiological and botanical periodicals [mainly those in English] from which to add to our knowledge. Such additions total 256. The price by modern standards is reasonable. D.A.

2999. DERMINE, E., AND LIARD, O.
Identification et description de variétés du prunier européen. **(Identification and description of varieties of European plums.)**
Encycl. agron. vét., Com. nat. Ét. Cult. fruit. (IRSIA), 1957, 10×6½ in., pp. 322, bibl. 14, illus., 40s. or 275 Belg. Fr.

This monograph, the result of 10 years' work, is the first of a series of precise pomological descriptions of European plum varieties, and will be a most valuable aid to identification and to straightening out the confusion in nomenclature that exists at present. The work is divided into 3 parts: I. *The value of criteria for the identification of varieties.* This discussion of diagnostic characters is a slightly modified and extended version of a paper published in 1953 [*H.A.*, 24: 101]. II. *Descriptions of some plum varieties.* Detailed descriptions, well illustrated by photographs and line drawings, are given of the diagnostic characters of young leaves, flowers, fruits and stones for 33 varieties grown in Belgium. The varieties, listed under their common Belgian names, are also given a serial number as the name used is not always the true pomological one. III. *A dichotomous key to the identification of the varieties described,* using only fruit and stone characters.

The present work is of a much more specialized nature than van Cauwenberghe's recent book on Belgian fruit varieties [*H.A.*, 25: 1138], which concentrates mainly on the horticultural and commercial characters of the fruits concerned and is not intended to be used for precise identification purposes; Dermine and Liard do not mention the horticultural qualities of the varieties described. Foreign varieties of European plum will be dealt with similarly at a later date. P.R.-D.

3000. DE HAAS, P. G.
Marktobstbau. **(Commercial fruit growing.)**
Bayerischer Landwirtschaftsverlag, Bonn, 1957, 9½×7 in., pp. 464, bibl. 350, illus., DM. 39.

Among the spate of recent manuals on fruit growing this treatise from the director of one of the more modern research and educational establishments on fruit in north Germany, namely that at Hanover, is notable for its practical approach to the subject. It is well worth a place on the library shelf.

About one-third of the book is devoted briefly to the position of fruit growing in German national economy, to fruit markets in the larger countries and to the use of fruit generally, and at some length to the fundamentals of fruit production, which are essentially to be found first in climate, soil and the nature of the fruit tree's growth and secondly in the economic environment, the availability of land and labour and their proper use and the sensible application of capital to the many demands made on it for the development of a successful fruit enterprise.

The second part (p. 130–391) is devoted to the practical detail of how to set about fruit growing with discussions on choice of land and sorts and varieties of fruit, how to cope with problems of soil management, nutrition, pruning, pests and diseases and such questions as provision of water, frost and wind protection, the balance of growth and yield, premature fruit drop, bee keeping, etc., and finally in turn how it is necessary to proceed for the production of the different top fruits, hazels and walnuts and of the common berry fruits including blueberries. Considerable attention is given to rootstock selection and the choice of stem builders for hardiness. Descriptions of varieties are included. Next the author deals with harvesting, packing, storage and marketing and the various problems involved with different fruits.

Finally he gives an interesting chapter on horticultural education and research in Western Germany and lists the more important popular and scientific journals concerned with fruit problems in German along with three old friends in English [not unknown to our readers]. D.A.

3001. INTERNATIONAL HORTICULTURAL CONGRESS ORGANIZING COMMITTEE (NIEUWSTRATEN, J. P., EDITOR).
Report of the 14th International Horticultural Congress, Scheveningen, 29 Aug.-6 Sept., 1955, Vol. 1, pp. 913 and Vol. 2, pp. 915–1647, illus. Obtainable from H. Veenman & Zonen, Wageningen, Netherlands, price fl. 40.

Most of the papers of this congress were abstracted or noted in *H.A.*, Vol. 26, No. 1. They are here handsomely reproduced in full together with the Proceedings, and the Reports of the following subsidiary conferences held at, or in connection with, the congress: The International Committee on Horticultural Nomenclature and Registrations, pp. 1521–6; a meeting concerning problems of radiation measurements in plant irradiation, pp. 1527–9; and finally an International Conference on the Improvement of Vegetable Varieties, pp. 1531–1646. The last of these contains useful factual papers on the principal trends in the development of new vegetable varieties in the following countries: Australia, Austria, Belgium, Canada, Denmark, Egypt, France, Germany, Great Britain, Japan, the Netherlands, New Zealand, Norway, Union of South Africa, Sweden, Yugoslavia, together with a summary by O. Banga and certain other papers on the standardization and naming of vegetable varieties.

3002. KNOTT, J. E.
Handbook for vegetable growers.
John Wiley & Sons, N.Y., and Chapman & Hall, London, 1957, 7×5½ in., pp. 238, bibls, 32s.

Here is the vegetable growers' *vade mecum* on every conceivable subject except choice of variety, for which the reader is wisely directed to look at salesmen's catalogues or State College lists. Short precise notes are given, but the bulk of the information is tabulated. The author does not discuss reasons but he gives facts. These numerical facts refer to composition of manures and fertilizers, to soil reaction and its effect on availability of nutrients, to nutrient absorption by different vegetables, to seed to sow and to be expected as a crop, to application of water, to sprays and spraying, to compatibility of insecticides, to herbicides, to length of growing seasons, to yields, to storage temperature and moisture, to conversion of metric to other systems. But why continue? Buy the book and as a consequence you will surely not only become the armchair expert *par excellence* but you will also be able to regularize and economize your own vegetable growing expenditure. Its potential use is enormous. D.A.

3003. MAHLSTEDE, J. P., AND HABER, E. S.
Plant propagation.
John Wiley & Sons, N.Y., and Chapman & Hall, London, 1957, 9×6 in., pp. 413, bibls, illus., 60s.

Designed to teach students and experienced nurserymen the principles and practice of plant propagation, this book begins well by dealing concisely with plant classification, structure, and growth. Then come two sections, one on sexual and one on asexual propagation, forming the main part of the book. The origin and development of a seed is set forth with the help of some excellent diagrams, and beginners will welcome the concise descriptions of such processes as apomixis, polyembryony, and parthenocarpy. There is a good description of seed collection and cleaning, and many examples of mechanical aids. Information is given on the storage and pre-treatment of seed and other factors contributing to successful germination, including choice and sterilization of media.

A brief introduction to asexual propagation is followed by descriptions of its application to bulbs, corms, tubers, and typical rhizomes. Layering should have been given more attention. Air-layering, interesting to amateurs in the main, gets most attention, but propagators will not agree that the rooted layers are "handled like any other rooted plant". Neither will they agree that the layering of cherry, plum and apple stocks is not a commercial proposition. No single operation in vegetative propagation is more important than "cuttage", say the authors, in dealing with practical and theoretical aspects. Here, as elsewhere in the book, there is a tendency to expatiate on the interesting and topical at the expense of the well established; previously it was air-layering, now it is cuttings under mist. The requisite nursing care of cuttings rooted under mist is mentioned. Statements that the "importance of the rooting medium cannot be overemphasized", "the temperature in the medium is not an important factor" and in making hardwood cuttings "the base and tips of one-year-old shoots are removed" are peculiar notions which may mislead beginners. A chapter on the use of growth substances shows that faith is pinned to the powder method of application. The quick-dip method, so easy to apply to all classes of cuttings, as also to air-layers, deserves more attention. In fact, the dismissal of growth substances inside 3,000 words is somewhat cavalier.

The principal modes of grafting are described and many will feel at home with the old familiar diagrams, in spite of their rehatching. A rather inadequate chapter on rootstocks is partially redeemed by a list of fruit and ornamental rootstocks in common use. Hatton's classical researches are mentioned in the text but not in the selected references for further study.

Propagating units of many kinds are well described but each of the 8 selected references is concerned with mist propagation, another example of the topical swamping the tried and proven. Outdoor forcing structures are also well illustrated.

The final section deals with the practical propagation of some thirty specific plants, from apples to ferns; then comes the appendix, where one finds apple under *Malus* and pear under *Pyrus*, but what of it? Also, surprisingly, we learn that holly cuttings are not often employed, *Chaenomeles* spp. only come from seed, and rhododendrons are not commonly grafted. There are inconsistencies in the index, e.g. both stub- and veneer-graft are there in their own right but not under the general heading of grafting. An examination of sample references reveals only a modicum of errors, such as the substitution of "o" for "a" in the names of Marth and Wardlaw (p. 73) and some inaccurate dating in one or two places. The text and illustrations are excellent, the subject matter wide-ranging, and the references will lead to further sources of information, so helping the student to fill in the gaps. On the whole the work is well up to the standard of others in this field. Experience of recent book prices has "hardened us off", and the excellent paper, printing and binding has made the seemingly high price inevitable. R.J.G.

3004. Milthorpe, F. L. (Editor).
The growth of leaves, being *Proc. 3rd Easter School in agric. Sci., Univ. Nott., 1956.*
Butterworths Scientific Publications, London, 1956, 8½ × 5½ in., pp. 223, bibls, illus., 40s.

It is stated in the preface to these proceedings that the rate and mechanism of the photosynthetic reactions are relatively unimportant in determining yield compared with the effect of variations in the leaf surface area, and that it was to emphasize this principle that the Easter School was organized. This underlying assumption is examined and discussed by Dr. D. J. Watson in the last of several papers on the various aspects of leaf development under the title "Leaf growth in relation to crop yield". The other papers are presented under the following section headings: General aspects of growth and differentiation; Initiation of leaf primordia; Leaf expansion (including "Growth of leaves of an apple rootstock", by H. W. B. Barlow and C. R. Hancock, and "Leaf growth under constant conditions and as influenced by light-dark cycles", by E. Bünning); Influence of external forces on leaf growth (including "Influence of light and temperature on leaf growth", by G. E. Blackman); and Demonstrations (i.e., brief notices on measurement of leaf area, measurement of environmental factors, and observations on growth).

3005. Nijdam, J.
Woordenlijst voor de Tuinbouw in zeven talen. **(Dictionary of horticultural terms in 7 languages.)**
Minist. Landbouw, Visserij en Voedselvoorziening, Dir. van Landbouw, The Hague, undated, 7 × 5 in., pp. 394, fl. 3.50.

This is a much expanded revised version of the 4 language dictionary compiled by the same author. It now copes with Dutch, English, French, Danish, German, Spanish and Swedish. It has been neatly rearranged so as to eliminate excessive repetition and the key language is, very properly, Dutch. The words in the other languages are so cross-referenced to their Dutch equivalents that only a minimum of time is lost in tracing them. Generally speaking tropical horticultural crops and terms are not included, and within the sphere of horticulture the author does not pretend to cover the nice details of any particular branch of the subject. That, perhaps, in a small book which will slip into quite a small pocket would be too much to expect. There are, moreover, one or two slips, probably printing errors, which, on searching meet the eye and even one or two terms which might mislead the ignorant, but taken all in all it is quite the best thing of its kind which the reviewer has yet come across. It is understood that a new edition is contemplated, and is possibly now in preparation, in which yet another language, Italian, will be included. That will be even more welcome. D.A.

3006. Organisation for European Economic Co-operation.
The organisation and rationalisation of soil analysis.
European Productivity Agency, O.E.E.C., Paris, 1956, Project 156, 9½ × 6 in., pp. 219, bibls, illus., 12s., $2.00 or 600 F. fr.

Part I consists of a report, by Dr. Rice Williams and Dr. H. Riehm, on a survey of the organisation and methods used for soil analysis in various European countries. Part II consists of 12 papers read at a seminar held in Wageningen in October 1955, based on the above report and dealing with all aspects of soil analysis in relation to advisory work. Of special interest to horticulturists is a paper by F. W. G. Pijls on soil testing in relation to horticulture, with particular emphasis on methods used at Oosterbeek and Naaldwijk.

3007. Schindlmayr, A. (Translated and edited by Jackson, A. A., and Jackson, J. P.)
Useful plants.
Thames and Hudson, London and New York, 1957, 8 × 5½ in., pp. 127, bibl. 13, illus., 21s.

This is a translation of the small German book "Welche Nutzpflanze ist das?" A great deal of information has been packed into it by combining very clear drawings and tabulated notes. First all the important terms used in plant morphology are explained and illustrated. The main subject matter is divided into forage plants, miscellaneous crops (including basket willows, tobacco, dye plants, etc.), vegetables and herbs, covering the types grown in N.W. Europe. Pages of excellent line drawings alternate with pages of concentrated tabulated notes, giving the botanical description, flowering months, growth period (of annuals), seed rate, spacing, requirements of soil and climate, yield, uses, popular, scientific and family names of the plants illustrated and of a few not illustrated. It may be a little disappointing to some readers that the unmistakable cabbage and potato are illustrated—the latter both in line and colour while they may be longing to know what fenugreek, celtuce, Chinese artichoke and other uncommon plants described in the book really look like. The 8 colour plates give 32 illustrations of a very high standard.

A brief, but useful bibliography and separate English and scientific plant-name indexes complete the work. The aim, as expressed in the introduction, is to enable anyone with this book in his pocket to identify any cultivated plant (presumably herbaceous and non-ornamental) that he may encounter. The said pocket will be heavier by 11 oz., but lighter by one guinea, which is not exorbitant for a production of this type. Descriptions, though brief, are generally adequate and if occasionally such vague adjectives as 'small' or 'short' appear, or certain mauve or purple flowers are described as blue, these minor defects are more than compensated for by the excellence of the illustrations. The book should be an interesting addition to senior school and college libraries. It is one of a series entitled 'Open air guides' and would help those with an interest in farming and gardening to widen their knowledge with very little effort.

K.H.C.

3008. Seitzer, J.
Farbtafeln der Apfelsorten. **(Apple varieties in colour.)**
Eugen Ulmer Verlag, Stuttgart, 1956, 6×8 in., pp. 112, DM. 10.80.

This small but solid book, with excellent coloured illustrations on one side and details of characters, and appreciations opposite, will receive a warm welcome outside Germany. Fifty varieties are described, among them many known elsewhere, such as Golden Delicious, Laxton's Superb, Blenheim Orange and others. Similar volumes are promised on pears, stone fruits and small fruits.

3009. Tressler, D. K., and Evers, C. F.
The freezing preservation of foods. Vol. 1. Freezing of fresh foods.
Avi Publ. Co. Inc., Westport, Conn., 1957, 8×6 in., pp. 1214, bibls, illus., $18 in U.S.A., $19 elsewhere.

This third edition, revised and in fact largely rewritten, affords a most modern and authoritative treatise on the many problems involved. About half of the first volume is devoted to questions of particular interest to the horticulturist. The enunciation of general principles governing freezing preservation is followed by practical, up-to-date advice on the following among other problems: Dehydrofreezing of fruit and vegetables; frozen food locker plants; packaging materials; adaptability of vegetables to freezing; freezing of vegetables; fruit varieties for freezing; preparation for and freezing preservation of fruits; manufacture and freezing of fruit juices; freezing concentration of juices; vacuum concentration of juices.
Vol. 2 will deal with precooked and prepared foods.

3010. Wright, D. M.
The Cox's Orange Pippin.
Faber & Faber, London, 1957, 9×6 in., pp. 119, illus., 15s.

This book describes the specialized treatment of the Cox's Orange Pippin apple tree. The enthusiast, whether he is the proud possessor of a single tree or several hundred, will find excellent factual information in this book. It is divided into fifteen chapters which deal with soils and their management, mineral deficiencies and excesses, the siting and planting of a Cox orchard, rootstocks, pruning principles and practice, pests and diseases. Some will indeed be grateful for the inclusion of a chapter on "The neglected tree"! There are two appendices, the first dealing with spray programmes and hints on their execution, and the second with the different stages of bud and blossom development in relation to the timing of pest and disease control measures. Mr. Wright has been fortunate in incorporating as one of the chapters Mr. Simmond's article on "Mr. Cox of Cox's Orange Pippin" which appeared originally in the R.H.S. Journal for November, 1943, and which must have reached all too small an audience during the war. The author writes from personal experience, and he has also been to much trouble to present up-to-date information from research reports. The chapter on pollination is full of good sense, for example, "when thinking of pollinating plans, always think in terms of the typical English spring, which is a near-Arctic temperature with blinding rain or winds that come from Siberia". In the list of varieties suitable as pollinators for Cox, the tendency towards biennial blossoming of Laxton's Fortune and Early Victoria should have been noted as well as that of Laxton's Superb.
This is a most enjoyable book that would make an excellent gift. By the time a second edition is called for let us hope that Mr. Wright will have something to tell us about inducing more of these elusive Cox's to stay on our trees.

A.P.P.

3011. Wright Rain Ltd.
Sprinkler irrigation manual.
Wright Rain Ltd., Ringwood, Hants [undated, received 1957], pp. 150, bibls, illus., 12s. 6d.

This collection of papers on irrigation technique and practices includes those given at the Sprinkler Irrigation Symposium held at Bournemouth in 1956. Section I is devoted to papers on water supplies, water quality, soil moisture and calculation of irrigation needs. Section II deals with sprinkler irrigation design, nozzles, pumps and power units. Section III contains papers on the irrigation of crops, including "Water needs of fruit crops", by J. E. Goode, "Tobacco growing with and without irrigation in Southern Rhodesia", by J. R. Hill, and "A report on frost protection by sprinkler irrigation equipment in Germany", by C. S. Wright.

Annuals and reports.

3012. Almindelig Dansk Gartnerforening.
(Danvig, A. M., and Pedersen, K.)
Årbog for Gartneri 1956. **(Horticultural Yearbook 1956.)**
S. L. Møllers Bogtrykkeri, Copenhagen, 1957, pp. 260, illus., Kr. 5.

An exhaustive directory (pp. 7–45) and statistical data (pp. 46–78) are followed by reports of various institutions and committees of the Danish Horticultural Society. Small-scale manurial and cultural trials concern the following, among other crops: Cucumbers, carnations, celery, apples and tomatoes (pp. 109–28). Results of variety trials with outdoor chrysanthemums, dahlias, *Erigeron* and *Primula malacoides* are presented in the ornamental section (pp. 138–52). Trials with lettuce, parsley, outdoor cucumbers, spinach, carrot, scorzonera and beetroot varieties form the subject of the 37th Annual Report of the Committee for Vegetable Variety Trials (pp. 153–257), the main points of which are repeated in a 3½-page English summary.

3013. Canada Department of Agriculture.
Science Service Laboratory, London, Ontario, Report, 1951-1956, 1956, pp. 46, illus.

The first report published by this Laboratory since its foundation covers the work of the first 5 years. This has been mainly concerned with "ecological chemistry", i.e. the study of the action and effect of insecticides and fungicides on host, parasite and environment.

3014. Colonial Pesticides Research Unit.
Progress Report No. 19, April-Sept., 1956, Arusha, Tanganyika, pp. 12.

Among results of experiments recorded briefly are the control of the bean fly, *Agromyza* (*Melanagromyza*) *phaseoli*, by seed dressings of aldrin, endrin and dieldrin, and of *Pseudotheraptus wayi* on coconuts by aerial applications of DDT applied as a coarse aerosol at 0·7 lb. per acre.

3015. Department of Agriculture for Scotland.
Agricultural Statistics, 1955, Scotland, H.M.S.O., Edinburgh, 1957, pp. 92, 5s.

Horticultural statistics for Scotland are given on the following: Acreage under vegetables, under small fruit and orchards and under glasshouses in 1955, production of vegetables and of fruit from 1945 to 1955, wholesale prices of fruit and vegetables 1946 to 1955, and summary of output of fruit and vegetables from 1952/53 to 1954/55.

3016. East Malling.
Annual Report East Malling Research Station, 1956, 1957, **A40**, pp. 196, bibls, illus., 17s. 6d., or $2.50 post free.

The arrangement of this report resembles that of its predecessors, and, as in the past, most of the research reports and grower's bulletins, which form Parts III and IV, have been abstracted or noted separately. Exceptions to this include two grower's bulletins which summarize items of practical interest on fruit crops and hop diseases, that might otherwise have escaped notice in the general review of research work (Part II).

3017. Institut de Recherches pour les Huiles et Oléagineux (I.R.H.O.).
Rapport annuel 1955. (**Annual Report of the Institute for Research on oils and oil plants for 1955**), Paris, 1956, pp. 110.

Oil palms. On the basis of figures from 4 tropical regions critical nutrient levels for the 17th leaf have been established, viz. N 2·5%, P 0·15%, K 1%, Ca 0·6% and Mg 0·24%. In trials on K manuring at Dabou the residual effect of the fertilizers was apparent for 4 years; single high doses of K applied broadcast acted more quickly and effectively, and were more economic, than smaller, annual doses. Leaf K was reduced when bunch production was more than 60 to 70 kg. per tree. K reduced abortion and increased bunch numbers and average bunch weight. *Centrosema* and *Pueraria* had a better effect as cover crops than maize, cassava or groundnuts. *Coconuts.* Studies on flowering, mineral nutrition and diseases are reported. *Shea butter nuts.* Studies are in progress on seed sowing techniques, selection of parent trees, storage of nuts and kernels, nut drying and shelling, and extraction of butter. *Castor beans.* Variety trials and studies on artificial and natural pollination, selection and breeding are outlined.

3018. John Innes.
47th Annual Report of John Innes Horticultural Institution, 1956, Bayfordbury, 1957, pp. 47, 3s.

Work in progress in the various sections includes: *Plant Breeding:* progress in breeding new apples, blackberries, raspberries and strawberries; embryo incompatibility in progenies of Beurré Bedford; the lateral suppressor mutant and hybrid vigour in tomato; induced mutants in crop improvement; apomixis and pollen fertility in *Rubus*, and chromosome number in Youngberry; rose rootstock trials. *Genetics:* ageing in seeds; studies on anthocyanin pigments. *Physiology and plant culture:* light, temperature and heating in glasshouses; growth and development of tomato; pH of JI composts; types of loam for potting composts, acid composts for azalea and rhododendron varieties, and the germination of lily seed.

3019. Ministry of Agriculture, London, Department of Agriculture, Edinburgh, Ministry of Agriculture, Belfast.
Agricultural Statistics, 1955/56. United Kingdom. Agricultural censuses and production.
H.M.S.O., London, 1957, pp. 36, 3s.

Details are given of acreage, yields per acre and production of particular crops in the three countries, differentiating between the different fruits and vegetables with comparisons against similar figures since 1946. Separate figures are given for vegetables for human consumption. Figures given for nursery stock and flowers refer separately to areas under cultivation in the open and under glass.

3020. Missouri.
A fortune to share in research, being ***Annual Report of the Missouri Agricultural Experiment Station, 1954-55,*** being *Bull.* **664**, pp. 109.

Among projects reported are *Entomology:* Control of codling moth and other insects. *Horticulture:* irrigation of peaches; leaf analysis of apple and peach trees; use of antibiotics in disease control; tomato, onion and watermelon breeding; certification of virus-free fruit rootstocks; gladiolus cultivation; strawberry variety trials and breeding; sterility in blackberries; lettuce disease control and nutrition; peach and apple fruit thinning by sprays; application of antiauxin to young tomato plants; weed control in vineyards, vegetables and lawns; control of downy mildew and black rot in grapes; response of vegetables to cationic saturation levels on low exchange soils; lindane residues on pickling cucumbers; effect of pesticides on fruit finish in apples; and peach disease control.

3021. ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Inlichtingen en Onderzoekingen van de Afdeling Tropische Producten in 1955. **(Information and research in 1955 of the Tropical Products' Department.)** [English summary 12 pp.], 1956, pp. 76, bibls, illus., f. 3.50.

Among the studies reported are: *Cocoa:* the iodine content of cocoa butter. *Oils and fats:* seed composition of *Caryodendron orinocense;* the use of oil palm kernels in floor coverings. *Fibres:* properties and composition of *Bombax* kapok; the use of *Furcraea* fibre in bags for produce. *Fruits:* shipping bananas in polyethylene bags; analysis of banana powder samples.

3022. SOCIETY OF CHEMICAL INDUSTRY.
Reports on the Progress of Applied Chemistry. 1955, Vol. 40, pp. 1,000. Soc. Chem. Ind., 56 Victoria St., London, S.W.1, £3.

The parts which are of special interest to horticultural readers are the following: *Horticulture* (C. Bould of Long Ashton), pp. 613-22, bibl. 51, covering fruits, vegetables and glasshouse, crops; *Agricultural Fungicides* (W. H. Read and R. J. Smith of Toddington Research Station), pp. 642-53, bibl. 92, covering the use of antibiotics; *Agricultural Insecticides* (A. H. M. Kirby and R. P. Tew of East Malling), pp. 653-65, bibl. 141; *Control of plant nematodes* (B. G. Peters of Imperial College, S.W.7), pp. 674-6, bibl. 17; *Herbicides* (L. C. Luckwill of Long Ashton), pp. 676-80, bibl. 37; *Chemicals against rodents and other animal pests* [including birds] (E. E. Turtle and A. Taylor), pp. 680-87, bibl. 62; and *Essential oils* (G. R. A. Short and W. J. Bush & Co.), pp. 747-61, bibl. 149.

Revived periodical.

3023. GOLD COAST DEPARTMENT OF AGRICULTURE.
New Gold Coast Farmer [*New Gold Cst Fmr*], 1956, Vol. I, No. 1, pp. 41, illus., subscription 5s. (overseas) or 4s. (Ghana) per year.

The Gold Coast Farmer has been revived as a quarterly by the Department of Agriculture with several aims in view, namely, to present and discuss Gold Coast agricultural problems, to provide information for the literate farmer and to disseminate information to the staff of the Department. From Vol. 1, No. 4 the journal will be re-named *The Ghana Farmer*.

Noted.

3024.

a BRITISH HONDURAS.
Annual Report of the Agricultural Department, British Honduras, for the year 1955, pp. 55.
Includes work on coconuts, sugar cane and ramie.

b DEUTSCHER PFLANZENSCHUTZDIENST.
Jahresberichte der Pflanzenschutzämter 1955. **(Annual reports of the West German Plant Protection Service for 1955)**, Biologischen Bundesanstalt für Land- und Forstwirtschaft, Braunschweig, 1956, pp. 228.
Activities of 17 stations of 10 "Lander" on pest and disease control.

c NIGERIA (FEDERAL DEPARTMENT OF COMMERCE AND INDUSTRIES, LAGOS).
Handbook of Commerce and Industry in Nigeria, 3rd edition, 1957, pp. 265+maps supplement, 10s.

d NORTHERN NUT GROWERS' ASSOCIATION.
46th Annual Report of the Northern Nut Growers Association, 1955, pp. 138.
See separate abstracts in appropriate sections.

e PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.
Jaarboek 1955. **(Yearbook of the Plant Pathology Service, Wageningen, 1955.)** *Meded. PlZiekt. Dienst* **129**, 1956, pp. 208, illus., fl. 4.
See separate abstracts in vegetable and flower sections.

f REPUBLIC OF IRELAND.
Twenty-fifth Annual Report of the Minister for Agriculture, 1955-56.
Dublin, Govt. Publ. Sales Office, pp. 163+81, 7s. 6d.

g ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Vijf en veertigste Jaarverslag Koninklijk Instituut voor de Tropen, Amsterdam, 1955. **(45th Annual Report of the Royal Institute for the Tropics, Amsterdam, 1955)**, 1956, pp. 75, illus.

h SEYCHELLES.
Annual Report of the Seychelles Department of Agriculture for 1955, [1956], pp. 35.

i STAHL, C.
Beretning fra Statsfrøkontrollen for det 85. arbejdsår fra 1 juli 1955 til 30 juni 1956. **(Eighty-fifth Report of the Danish Seed Testing Station for the year 1 July 1955 to 30 June 1956.)** [English summary 2½ pp.] *Tidsskr. Planteavl*, 1957, **60**: 729-804.

j SURINAM.
Jaarverslag Departement van Landbouw, Veeteelt en Visserij, Suriname over 1954. **(Annual Report of the Surinam Department of Agriculture, Stock and Fisheries, 1954)**, 1957, pp. 124.
Includes work on coconuts, oil palms, citrus, bananas, cacao and coffee.

k UGANDA.
Department of Agriculture. Record of Investigations, No. 4, 1952-54, 1956, pp. 87, 3.75 shs.
See separate abstracts on tobacco.

l WUNDSCH, H. H. (EDITOR).
Jahrbuch 1953/1954. Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin. **(Yearbook 1953/1954 of the German Academy of Agricultural Sciences in Berlin)**, 1955, pp. 422.
Including staff lists and research in East German Institutes.